

OPERATING MANAGEMENT'S  
OWN MAGAZINE



# CHEMICAL PROCESSING

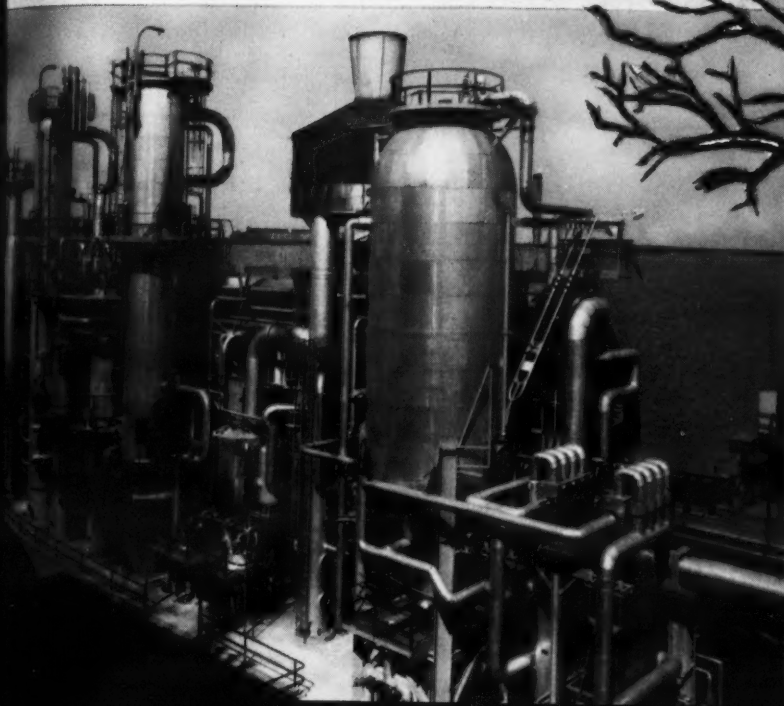
DECEMBER 1984

## Lead Outside Your Field, Too

Traditional scientific boundaries can be ignored  
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## Active Catalyst Keeps Cool

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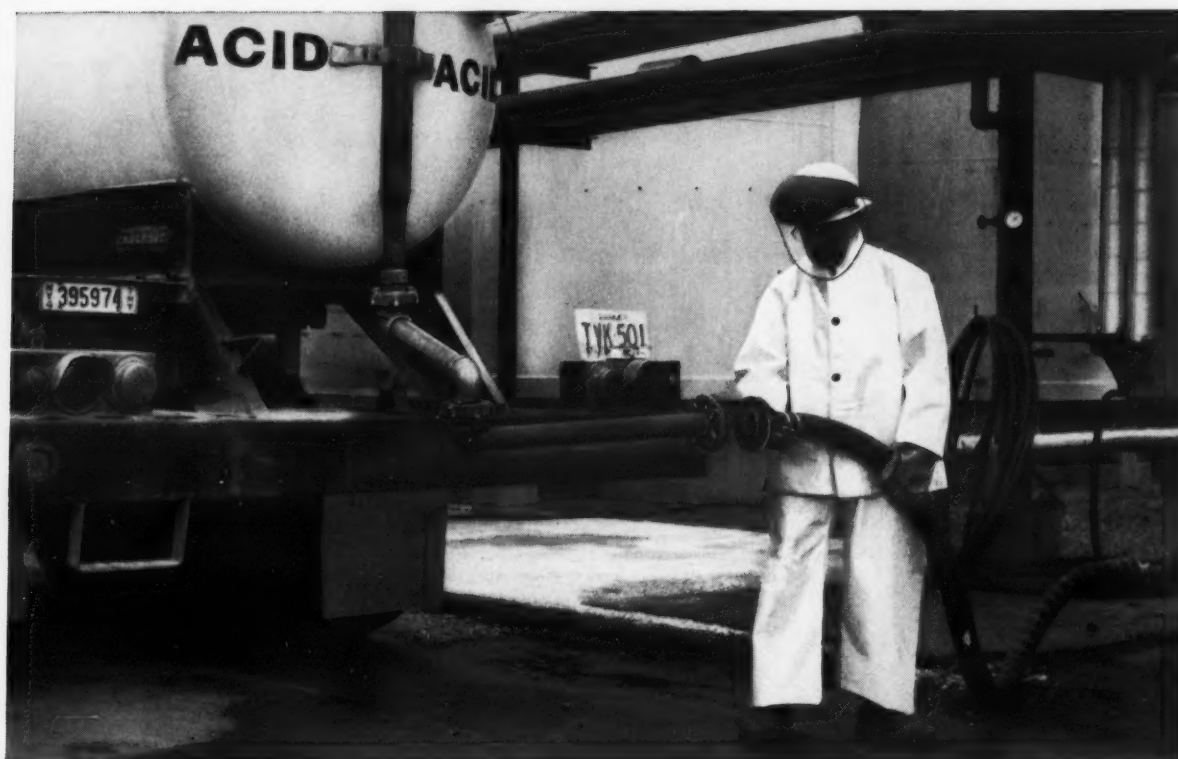
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conventions  
and exhibits

Dec. 11-13. Pharmaceutical Manufacturers Association, Eastern Regional Meeting, Waldorf-Astoria Hotel, New York.

Jan. 22-25. National Plant Maintenance and Engineering Show, Convention Hall, Philadelphia, Pa.

Jan. 25-27. National Society of Professional Engineers, Winter Meeting, King Edward Hotel, Jackson, Mississippi.

Jan. 30- Feb. 2. Annual Technical Conference, Society of Plastics Engineers, Penn-Sheraton Hotel, Pittsburgh, Pa.

Feb. 5-9. American Society for Testing Materials, Committee Week Meetings, Statler-Hilton Hotel, Dallas, Texas.

Feb. 6-8. Conference, Reinforced Plastics Division, Society of the Plastics Industry, Edgewater Beach Hotel, Chicago.

Feb. 7. Second Annual Conference, American Association for Textile Technology, Hotel Commodore, New York City.

Feb. 8-10. Physical and Chemical Testing Methods Course, American Society for Quality Control, Northeast Tennessee Section, Downtown Motor Inn, Kingsport, Tenn.

Feb. 12-15. 12th Exposition of the Air-Conditioning, Heating and Refrigeration Industry, Los Angeles, California.

Feb. 16-18. American Society for Metals, Conference, Fairmont Hotel, San Francisco, Calif.

Feb. 18-22. American Institute of Mining, Metallurgical and Petroleum Engineers, As

DEC

... Meetings and shows of interest to the chemical industries

nual Meeting, New York City.

March 5-9. Pittsburgh Conference on Analytical Chemistry and Applied Spectrometry, Pittsburgh Section of American Chemical Society and Spectroscopy Society of Pittsburgh, Penn-Sheraton Hotel, Pittsburgh, Pa.

March 27-29. American Power Conference, Sherman Hotel, Chicago, Ill.

April 4-6. Society of the Plastics Industry, Western Section Conference, Hotel del Coronado, Coronado, Calif.

April 9-10. Chemical and Petroleum Instrumentation Symposium, Instrument Society of America, Wilmington, Del.

April 9-12. National Packaging Exposition, American Management Association, Coliseum, New York City.

April 9-13. Metals Engineering Conference, American Society of Mechanical Engineers, Sheraton-Cleveland Hotel, Cleveland, Ohio.

April 9-13. American Welding Society, Annual Meeting and Exposition, Hotel Cleveland, Cleveland, Ohio.

April 30-May 3. Design Engineering Show, McCormack Place, Chicago.

May 6-10. Electrochemical Society, Annual Meeting, Statler-Hilton Hotel, Los Angeles, Calif.

May 7-9. American Oil Chemists Society, Spring Meeting, Roosevelt Hotel, New Orleans, La.

May 14-16. Technical Association of the Pulp and Paper Industry, Coating Conference, Netherland-Hilton Hotel, Cincinnati, Ohio.



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Check 2076 opposite last page.

**THIS MONTH'S COVER**

The Zimmermann process — which is being widely hailed as an effective solution to the disposal of organic wastes — is portrayed on this month's cover. Photograph shows the Zimmermann plant at Borregard Paper Company in Norway, where it disposes of waste-sulfite liquors so that stream pollution is avoided. The process also minimizes the threat of air pollution inasmuch as the reactors emit an essentially odorless gas. Article on this installation starts on page 30.

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The key to solution of that tough plant problem may be hidden in literature of another field

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Its re-usability and ease of application are pushing it to prominence in the CPI

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Grinding unit has higher output, needs less supervision and maintenance than its predecessor in same job

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over the editor's  
shoulder



### CP 'package' is new ... for '62

You're looking at the last issue of **Chemical Processing** in its present size and format. The New Year will ring in a completely new look for the magazine.

Come January, page size will be narrower by approximately two inches. Height remains the same. The new (for CP) 8½-by-11½-inch size is what the publishing trade calls "standard size."

Hand in hand with the size change goes a complete redesign of format. New headline and caption type faces will provide higher readability. There will be more opportunity to use larger photos and diagrams. Overall makeup has been painstakingly planned to simplify your job of finding the articles of key interest to you in your job.

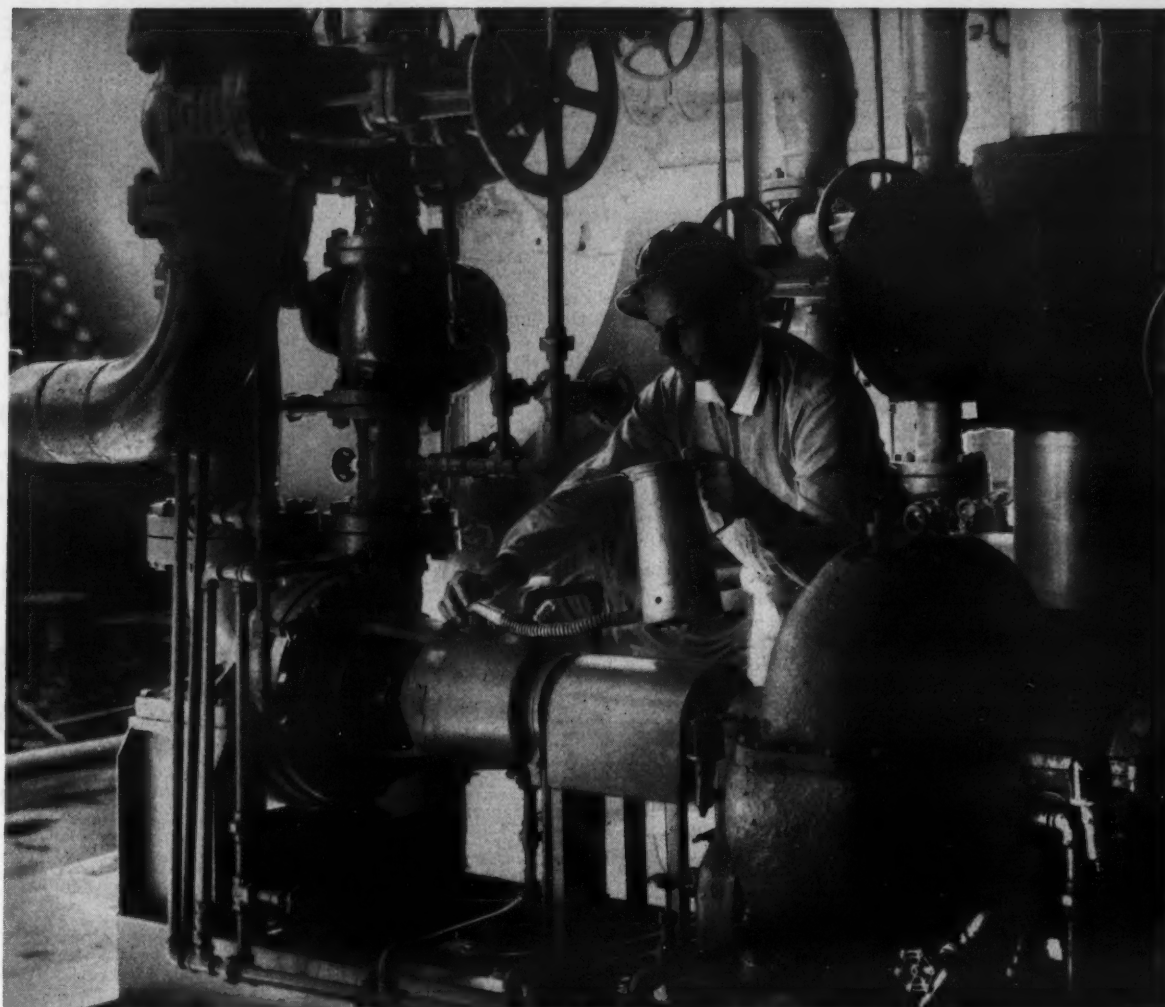
It goes without saying that much thought and "soul-searching" has preceded the change. Our old size, which Putman Publishing Company pioneered with CP in the late '30s, has many features that have served good purposes. But extensive, months-long study and opinion-polling convinced us that a size switch was in order. The new, smaller page size will be easier to handle. The magazine will open flat at any point, thanks to a change in binding.

Of course, the standard size is not a complete stranger to Putman Publishing Company. Two of the firm's magazines, **FOOD BUSINESS** and **QUEST**, have been published in that size since their inception.

While format will change, the basic editorial policies of CP remain the same. Editorially we will still be serving you, the operating manager in the chemical processing industries. We will continue to provide editorial material on new techniques, processes, equipment, instruments and chemicals... written in terms of your on-the-job problems in building, operating and maintaining your plants with highest effectiveness.

*Dana B. Berg*

Executive Editor



In this charge pump at Shell Oil Company's Deer Park, Texas, refinery, Ni-Resist impellers handle acid-reaction output with

½% sulfuric acid—at 3600 rpm. Lab tests indicate Ni-Resist has 8 times the staying power of cast iron in 2% H<sub>2</sub>SO<sub>4</sub> solution.

## Shell specifies Ni-Resist impellers for pumping dilute H<sub>2</sub>SO<sub>4</sub> at 3600 rpm

Shell Oil Company installed two of these debutanizer charge pumps at their refinery in Deer Park, Texas. The pumps handle acid-reaction output. Some of this output contains up to ½% sulfuric acid.

**Pumping dilute sulfuric at 3600 rpm** can be highly corrosive, so Shell specifies Ni-Resist\* iron for these impellers. Unlike ordinary cast iron, Ni-Resist impellers withstand the punishing effects of dilute H<sub>2</sub>SO<sub>4</sub>—while running at fast speeds.

**Are acids, alkalis or other corrosives eating away at your profits?** The Ni-Resist irons can add years of life to your equipment, lowering replacement

costs. Here's how these nickel alloys work for you:

- **Ni-Resist irons resist many corrosives** at high or low velocities, especially those encountered in petrochemical service.
- **Ni-Resist irons resist wear.** In many corrosive environments, they add service life to valves, seals, and pumps exposed to metal-to-metal wear.
- **Ni-Resist irons keep costs down.**

Economically cast into pipes, vessels, and other simple or complex shapes, Ni-Resist irons are easily machined and welded.

**Want more details** on how these nickel-alloy cast irons may save money in your refinery? "Engineering Properties and Applications of Ni-Resist," a 70-page booklet, is yours for the asking.

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Check 2077 opposite last page.

# PACKAGED AIR HEATERS by THERMAL

Extreme compactness, high efficiency and versatility of operation are the chief characteristics of the THERMAL Type CA direct fired air heater. Designed around the high velocity THERMAL burner, it normally requires no refractory, since combustion is limited almost entirely to the burner itself. Adding to its versatility, the CA air heater performs equally well on gas, oil or combination firing and can be adapted to all pressure levels.

Type CA air heaters are most frequently sold as "packaged" units complete with all necessary safety and control apparatus. These units will provide outputs ranging from 200,000 BTU/hr to better than 30,000,000 BTU/hr and at temperatures from 300F to 1500F or higher.

Type

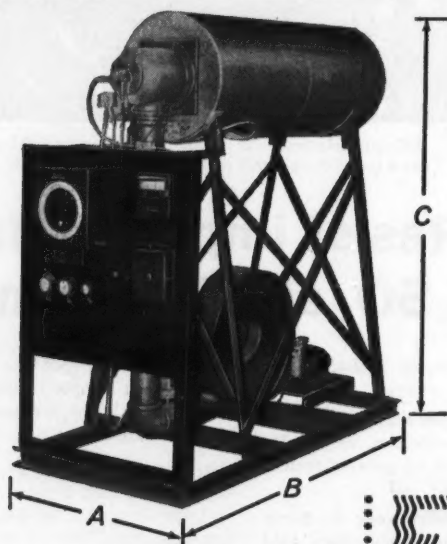


direct  
fired

## TYPICAL SIZES...

Listed below are the overall dimensions of a few of the dozens of output, temperature, and flow combinations possible in these heaters. Figures are for atmospheric pressure units. Higher pressure heaters would be smaller.

BTU/hr	AIR FLOW scfm	TEMP. IN °F	TEMP. OUT °F	A ft.	B ft.	C ft.
800,000	1,000	60	750 F	2½	4½	4
2,500,000	5,000	60	500 F	4	7	6
4,000,000	16,000	700	900 F	7	11	8
10,000,000	8,500	60	1,000 F	5½	10	8
15,000,000	10,000	60	1,200 F	6	12	8



Write for Bulletin #112

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DECEMBER 1961

VOLUME 24 • NUMBER 12

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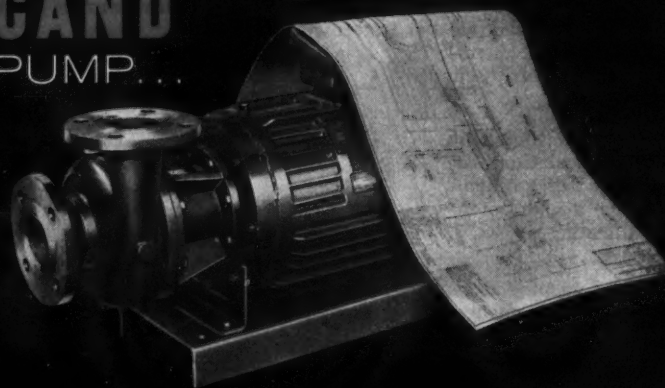
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DECEMBER 1961

The remarkable leakproof

**electri-  
CAND  
PUMP**



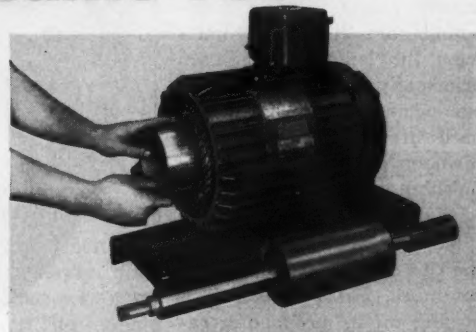
To give more value, pumps and motors are designed together . . .  
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Specify satisfaction . . . specify leakproof *Electri-Cand* pumps to safely handle "unpumpable" liquids. They're products of Allis-Chalmers combined skill in building pumps and motors. A-C designs both major components in integral horsepower sizes to work well together . . . carefully integrates them for absolute leakproof performance, for maximum reliability.

*Electri-Cand* pumps handle practically any solids-free solution: precious liquids, corrosives, toxic fluids, volatile compounds. As for safety . . . *Electri-Cand* pumps rated up to 91 psi are UL approved for Class I, Group D hazardous locations — nearly twice the approved rating of any other "canned" pump.

Removable, straight can design simplifies field inspection and maintenance. Choice of non-metallic sleeve type or *Fluid Piston* bearings . . . tailored to your application. Bearings take care of themselves . . . are lubricated by the pumped liquid.

For efficient, safe handling of "problem" liquids, contact your A-C representative, or write to **Allis-Chalmers, Industrial Equipment Division, Milwaukee 1, Wisconsin.**



Another *Electri-Cand* pump exclusive: removable, reusable sealing cans. In the event of stator failure, simple maintenance procedure is to repair the stator and reuse the original "can." Saves trouble; saves time; speeds pumps back to service. *Electri-Cand* and *Fluid Piston* are Allis-Chalmers trademarks.

**ALLIS-CHALMERS**



A-1519

Check 2079 opposite last page.

## Olin expects to tap \$10-million market with flies' nemesis but not before '64

Insecticides and repellants, the latter lately touted as the answer to some pests' amazing ability to build up resistance to insecticides, notably DDT, may be shouldered out of the picture by a dark horse, chemosterilants.

Chemosterilants is the sobriquet given certain chemicals which induce sterility in insects.

**USDA scientists and Olin Mathieson Chemical Corporation researchists believe chemosterilants have a high potential for eradicating some of our worst pests.**

At the formal opening of its New Brunswick, N.J., agchem laboratory, Olin revealed that it was backing a compound, dubbed Apholate, to cash in on the \$10-million-a-year market for insect control materials. Olin's entomologists are working with the USDA on experiments to achieve maximum effectiveness and safety. Target date for unwrapping the product is 1964.

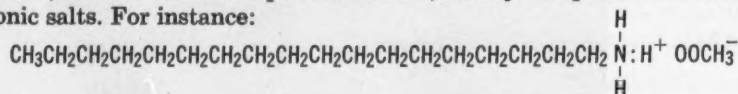
The USDA reveals that of 2000 chemicals screened, a half-dozen derivatives of ethylenimine, a family of relatively simple organic compounds, are the most promising. Ethylenimine is used principally to make triethylenemelamine which, in turn, is used in the manufacture of resinous products and textile finishing agents.

Maneuvering to cash in on the ripe polypropylene market continues. **Eastman Kodak** is beefing up its production capacity in the Texas Eastman division. The Longview, Texas, plant is being expanded by 50%. When this is completed, the plant will have a 30-million-lb/yr capability. This move follows on the heels of announcement of plans for building a pipeline to bring

## New patterns in chemistry with General Mills FATTY NITROGENS

**EXAMPLE: Fatty amines as corrosion fighters.**

The fatty amines, such as Alamine 4 pictured below, readily accept  $H^+$  ions to form positively charged cationic salts. For instance:



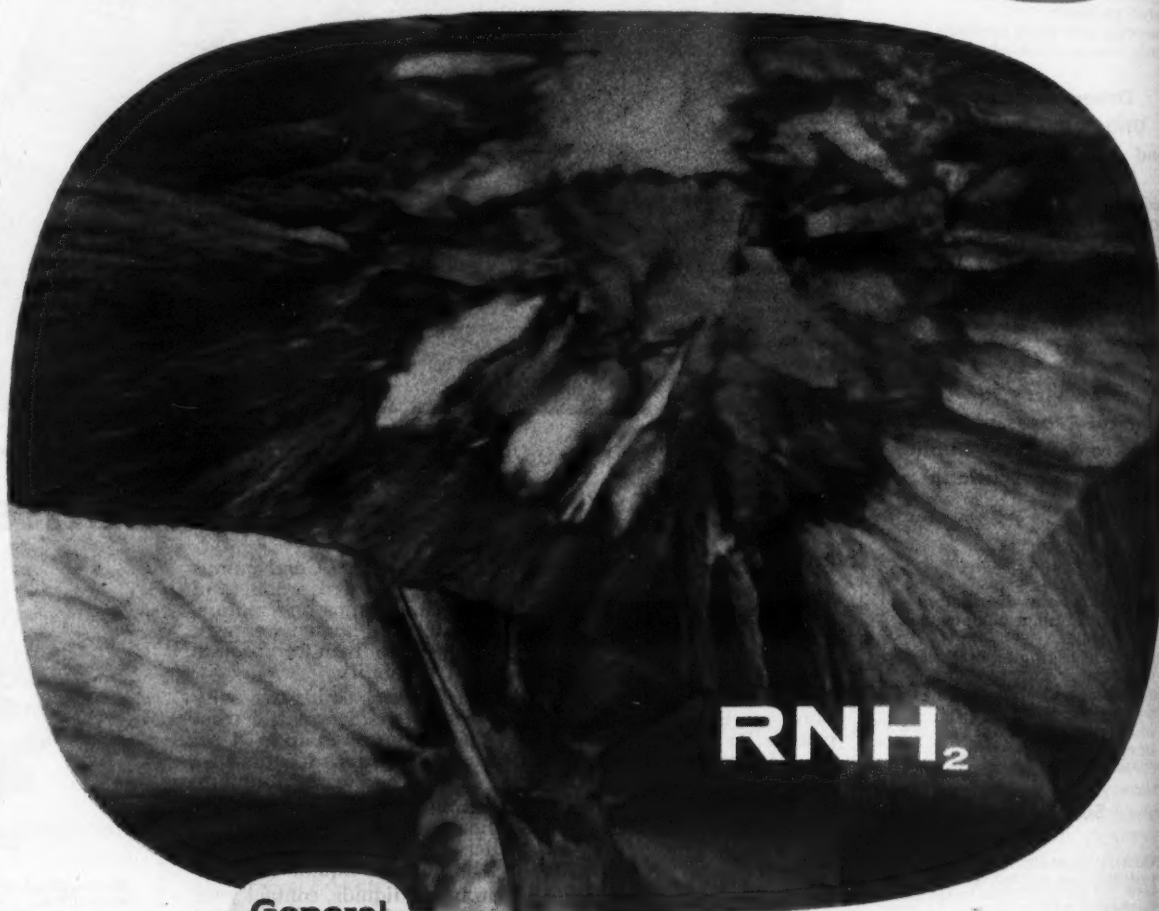
These amine salts film on metal forming a barrier against corrosive environments. The positively charged nitrogen group is strongly adsorbed on neutral or negative surfaces. The long chain unbranched alkyl group on the nitrogen repels water and permits close packing. Amine salts can be made either oil or water soluble.

General Mills produces primary, secondary, tertiary amines, fatty diamines and quaternary ammonium compounds that are useful

intermediates. Their high reactivity permits specific chain length and degree of unsaturation in the derived product. The wide selection of fatty nitrogens permits varied solubilities, surface activity and biocidal properties.

Why not investigate the potentialities of General Mills fatty nitrogens in meeting your own requirements. For research samples and complete descriptive literature on these chemicals, write us at Kankakee, Illinois.

*Crystals of lauryl amine, below, were photographed with polarized light at 100x magnification.*



# General Mills

# CHEMICALS

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**Check 2080 opposite last page.**



## New Dimensions of Fatty Nitrogens Revealed by General Mills

While making crystallographic studies of fatty nitrogens, a General Mills scientist discovered the unusual photograph you see at left. Here's the "inside" story:

A trinocular microscope quickly locates crystal area for examination. Large mirror (at top) speeds groundglass focusing, and an electronic light meter (lower left) determines precise exposures. Light source is conventional tungsten illuminator.

Crystals were grown in aqueous-alcohol media. Growth state of crystals, a single layer in thickness, was preserved with a toping of resinous mounting solution.

When exposed to polarized light, the fatty nitrogen crystals burst forth in a veritable aurora of color . . . the crystals refracting the light like a prism.

This picture, and others to appear in our advertisements, were taken at 100 x magnification. They grew out of the continuing basic research conducted at General Mills to find better ways to serve you of the chemical industry.



**CHEMICALS**

## OUR GROWING INDUSTRY

propane to Longview from South Texas.

Montecatini through its Novamont subsidiary has placed on stream a 30-million-lb/yr isotactic polypropylene plant at Neal, W.Va., and concurrently revealed that a film-producing plant would be built on the same 200-acre site next year.

Sun Oil is excavating 75,000-bbl cavern at Marcus Hook, Pa., for storing liquefied propylene, part of 150% expansion of high-purity propylene production at the refinery. Latter will boost capacity to 300 million lb/yr. Cavern is to be completed by mid-1962.

Marbon Chemical division of Borg-Warner Corp. will build a 75-million-lb/yr styrene plant near Humble Oil & Refining Company's Baytown, Texas, refinery. Output will go to Parkersburg, W.Va., Cyclocac polymer plant and Gary, Ind., plant which produces reinforcing resins. Both have been purchasing styrene from outside sources. Feedstock, ethylbenzene, will be pipelined from Enjay Chemical facility.

In deference to anticipated growing demand for petroleum and petrochemicals, Gulf Oil has boosted crude oil throughput of its Philadelphia refinery to 135,000 bbl/day, an increase of 15,000 bbl/day.

Standard Oil (Kentucky) has broken ground for its 100,000-bbl/day refinery at Pascagoula, Miss. Project includes widening of bayou to permit access by tankers and 104-mile pipeline to bring crude from offshore oil fields. Refinery is to be completed by mid-1963.

World's largest helium plant to be built at Liberal, Kas., by National Distillers and Chemical Corporation and Panhandle Eastern Pipe Line Company. Jointly-owned National Helium Corporation—newly formed—will own billion-cu ft/yr plant. Construction is to start in mid-1962;

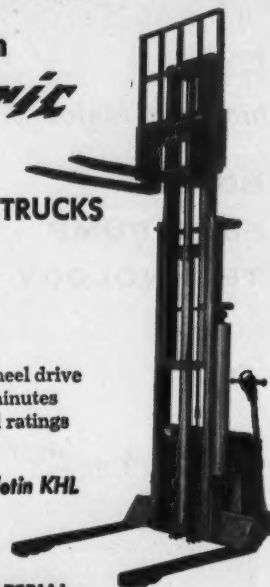
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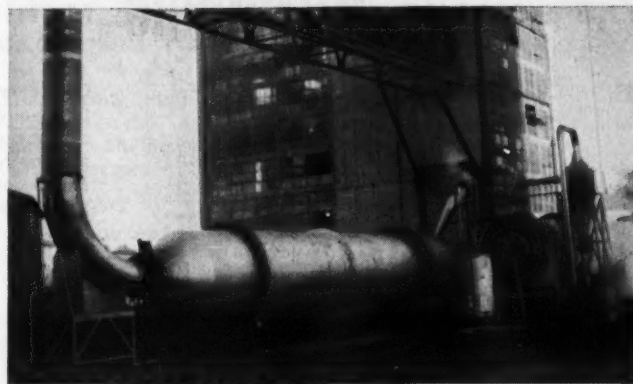
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Let our engineers consult with you on your Pressing, Drying and Cooling problems, or send for our Catalog C. For quick reference consult your Chemical Engineering Catalog.

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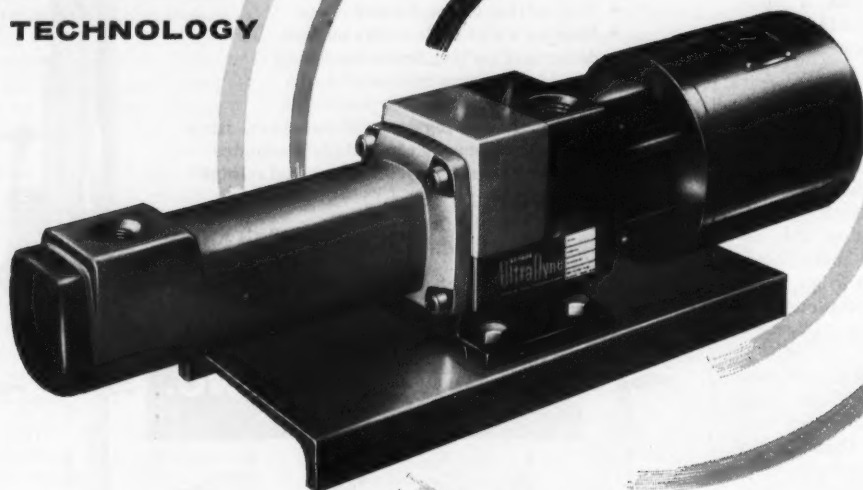
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**OUR GROWING INDUSTRY**

completion is due in two years.

Acquisition and merger paces continues unabated. Biggest transaction creates billion-dollar corporation, **Martin-Marietta Corporation** from the **Martin Company** and **American-Marietta**. New-comer **United Nuclear Corporation** and **Sabre-Pinson Corporation** on verge of merger which would give resulting from the **Martin Company** from the mine to actual production of atomic power. Also negotiating a merger agreement are **Hooker Chemical** and **Parker Rust-Proof Co.**

Among acquisitions were **R. E. Tongue Bros. Company, Inc.**, paper container manufacturers, by **Resisto Chemical Company, Inc.**; **Extrudo-Film Corporation**, subject to **Extrudo-Film** stockholders approbation, by **Enjay Chemical Company**; 160,000 shares of **Houdry Process Corporation** stock from **Sun Oil by Air Products and Chemicals, Inc.** **Alco Oil & Chemical** purchased four companies—**Miller Chemical and Fertilizer Corporation**, Baltimore, Md.; **Miller Chemical Corporation**, Charles Town, W. Va.; **Union Fertilizer Corporation**, Baltimore; and **Miller Chemical of New Jersey**, Bridgeton, N.J.

Between \$10 and \$15 million will be spent by **General Aniline & Film** to expand chlorine-caustic soda manufacturing facilities at **Linden, N.J.** Chlorine capacity will be boosted from 50 to 230 ton/day when work is completed early in 1963.

Two projects have been launched by **Chemical Division of Pittsburgh Plate Glass**. Construction started on a methyl chloroform plant at **Lake Charles, La.**, to be completed by fall; and ground was broken for a synthetic resins plant at **Circleville, Ohio.**

**Stepan Chemical Company** took two giant steps recently, establishing a toehold on the West Coast with a surfactant plant at **Commerce, Calif.**

To page 12

CHEMICAL PROCESSING

## THAT'S INTERESTING

### Studying surfaces

A technique for studying surface reactions enables researchers to see, via a fluorescent screen, the arrangement of the first monolayer of atoms on a surface.

Bell Telephone Laboratories scientists developed the method by which low energy electrons are diffracted from a surface and accelerated onto a screen by a strong electric field.

Use of the technique is expected to pave the way for a far more detailed understanding of catalysis and corrosion.

### Irradiated tires

Perfecting methods of vulcanizing rubber by radiation is one of the motives behind the stepping up of radiation research by Goodyear Tire & Rubber.

For more information on product at right, specify 2085 see information request blank opposite last page.



800

## WASTE TREATMENT

FROM DIAGNOSIS TO DISPOSAL

**INDUSTRIAL**, through its research and development groups, now offers the most complete waste treatment service available in the world today. The 800 Series inorganic waste treatment program includes:

- Preliminary survey service
- Pre-designed package plants
- Compact custom designed plants
- Installation service
- Continuing monitor service.

Systems for liquid/solid separation, gravity or pressure separation, by manual, remote or full automatic control or programming, are available for handling these solutions:

**ACID • ALKALI • CYANIDE • CHROME • OIL**

Write Dept. 800 for further details.

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**FILTER & PUMP MFG. CO.**

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Pressure Filters • Ion Exchangers • Corrosion Test Cabinets  
Pumps • Water & Waste-Treating Equipment

C-360

Ideally suited for the severe service conditions encountered in chlorine manufacturing and processing plants, pulp and paper mills, textile mills, etc.

## Crane steel globe and angle valves... recommended for water-free chlorine gas or liquid service at temperatures up to 300F.

**A.** Tough Teflon\*. . . highly resistant to abrasion, impervious to chlorine, will not contaminate chlorine.

**B.** Crane's new Teflon disc seats easily and tightly; Teflon-to-metal seat bearing assures positive closure, disc absorbs small particles of foreign matter on seating surface.

**C.** New disc design gives wide contact, quick-seal Teflon primary seating.

**D.** Secondary metal-to-metal seating eliminates overloading of Teflon disc.

**E.** New disc-stem connection assures accurate disc guiding and square setting.

**F.** Two-piece ball-type gland and flange exerts even pressure on new Teflon packing.

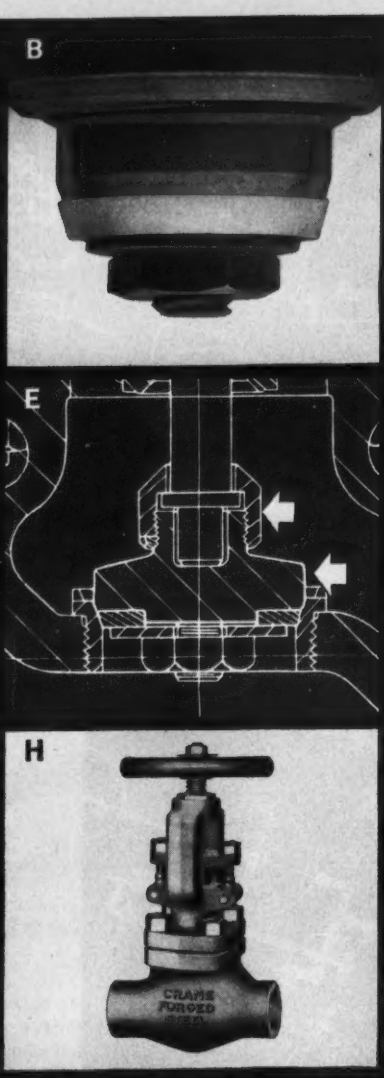
**G.** Swing type, hinged bolts for quick stuffing box service.

**H.** Valves available in:  
Globe, Screwed (No. 1644-TF) ½" to 2";  
Globe, Flanged (No. 1654-TF) ½" to 6";  
Angle, Screwed (No. 1645-TF) ½" to 2".

For complete details contact your Crane Distributor. Or write to Crane Co., Dept. E, Industrial Products Group, 4100 South Kedzie Ave., Chicago 32, Ill.

\*REGISTERED TRADEMARK OF E. I. DUPONT DE NEMOURS & CO., INC.

Cheek 2086 opposite last page.



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OF HOME AND  
INDUSTRY

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VALVES • PIPING • PUMPS  
PLUMBING • HEATING • AIR CONDITIONING  
WATER TREATMENT  
ELECTRONIC CONTROLS • FITTINGS

## OUR GROWING INDUSTRY

From page 10

and announcing plans to build a \$7-million phthalic anhydride plant in the burgeoning chemical complex on the south coast of Puerto Rico. Start-up is guaranteed by contract for fourth quarter of 1962. Naphthalene will be furnished by \$6.5 million plant being built concurrently by Commonwealth Oil Refining near Ponce.

International Minerals & Chemical and Husky Oil Company are joining forces to develop a 50-million-ton-phosphate reserve, owned by Husky, near Soda Springs, Idaho.

Multi-million-dollar construction contract for petrochemical facilities has been awarded by Ohio Oil through its subsidiary Aurora Gasoline Co., to Procon Incorporated, Universal Oil Products subsidiary. When completed by mid-year, facilities at Detroit, Mich., will supply Dew Chemical's Bay City, Mich., plant with 20 million gal/yr of benzene and toluene.

Diamond Alkali formally dedicated multi-million-dollar research center at Concord Township, Ohio. Center houses 200 research personnel, includes pilot plant areas.

Minerals & Chemicals Philipp Corporation plans to open \$2-million plant, incorporating its own ultra-flotation process, at McIntyre, Ga., early next year.

U.S. Peroxygen has completed expansion at Richmond, Calif., which doubles its capacity for producing tertiary butyl peroxide.

National Starch and Chemical's polyvinyl acetate resin plant at Meredosia, Ill., will be in operation before Jan. 1. Completion is expected to spur use of the resin as a base for aerosol hair sprays.

B. F. Goodrich Chemical has completed an ABS plastic materials plant three months ahead of schedule at Louisville, Ky.

## Sprays off car grime

An emulsifiable concentrate, used with a hydro-gun, enables a service station operator to completely clean a car motor in less than 20 minutes.

The cleaner, known as No. "7", was developed by Dupont.

The user simply sprays it on the motor, disconnects the plastic hose linking the gun to the container holding the cleaner; attaches the hydro-gun to a water hose and rinses off the grime.

The cleaner is also available for consumers in 16-oz. aerosol cans.

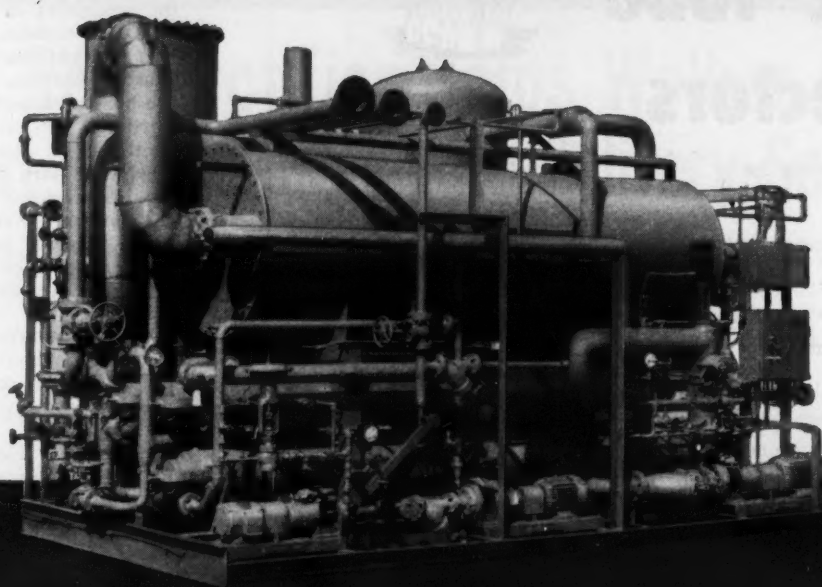
## Thefts hike costs 15%

**Employee thefts add some 15% to the cost of goods purchased by the American consumer, Norman Jaspan, management engineer, estimates.**

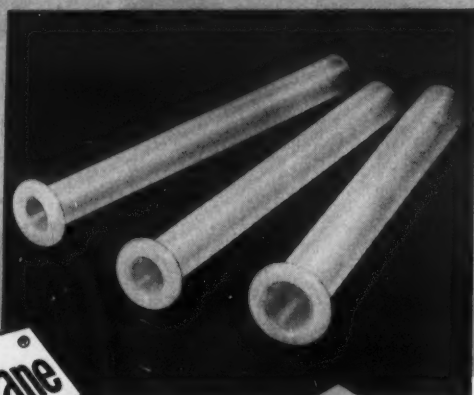
For more information on product at right, specify 2087 see information request blank opposite last page.

HOW  
BIRD  
PACKAGE  
UNIT  
PRODUCE

ANYWHERE



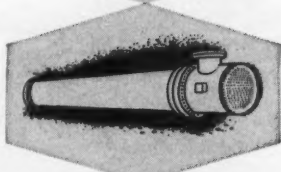
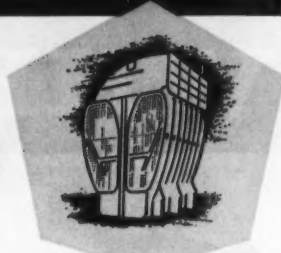
Lengthen  
Condenser  
and Heat  
Exchanger  
Life



John Crane

## Plastic\* Tube Protectors

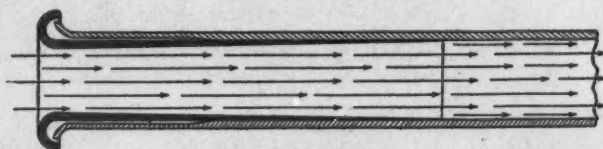
- Protect tube ends for life of tube.
- Positively prevent erosion and abrasion.
- Reduce costly tube maintenance and replacement.
- Easy to install—just slip into tube inlet after coating outer surface with cement.



\* Nylon, Polyethylene or Phenolic Resin

### PLUS EXCLUSIVE FREE-FLOW DESIGN

Wall thickness gradually tapers toward discharge end. Assures smoothest possible water flow, eliminates turbulence.



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Check 2088 opposite last page.



## Spotlight On People

### StanCal, SocMobile, Monsanto revise top-level lineups

Two oil-petrochemical giants last month acquired new presidents as a result of retirements.

**Otto N. Miller** moved into the presidency of Standard Oil Company of California to succeed **T. S. Petersen**, president since 1948. Petersen left Stan Cal under the company's mandatory retirement program. Refining, Eastern Hemisphere operations and research provided the principal rungs in Miller's 27-yr rise to the top. **R. Gwin Follis** continues as chairman of the board and chief executive.

**Herbert Willets** moved into the presidency of Socony Mobil Oil Company, Inc., as **Albert L. Nickerson** vacated that post to become chairman of the board, succeeding **Fred W. Bartlett**, retired. Nickerson continues as chief executive. **Fred H. Moore** succeeds Willets as president of the Mobil Oil Company Division, becoming a director and executive vice president of Socony Mobil in the process.

Inside Monsanto Chemical Company, vice-president **Robert K. Mueller** joins the company's executive committee and board while **John R. Eck**, concurrently elected a vice president, replaced Mueller as general manager of the Plastics Division.

At the same time, several operating units were realigned with the Chocolate Bayou Project and administration of monomer and chemical manufacture at Texas City, combined into a division to be known as the Hydrocarbons Division. Lion Oil Company also becomes a part of this division. Polymers produced at Texas City and marketing of monomers remains the responsibility of the Plastics Division. Vice president **H. Harold Bible**, general manager of the former Lion Oil Division, was named general manager of the Hydrocarbons Division. **F. E. Reese**, assistant general manager of the Plastics Division, transfers to the Hydrocarbons Division as assistant general manager.

Freeport Sulphur Company has acquired two new directors, two new vice presidents and an assistant vice president. Joining the board were **Richard C. Wells** and **Thomas R. Vaughan**. Wells is executive vice president of Freeport Sulphur and chairman of National Potash Company, jointly owned by Freeport and Consolidated Coal Company. Vaughan is vice president and general counsel. Elected vice presidents were **Peter Black**, president of Sulphur Export Corporation, and **Arthur W. Gilbart**. **Wilmer H. Kingsford** was named an assistant vice president.

**Robert B. Swope** and **Robert P. McMillan**, chairman and president, respectively, of Southern Oxygen Company, have been named directors of Air Products and Chemicals, Inc., which recently acquired Southern Oxygen.

Elected president and chairman of the board of United Nuclear Corporation was **Walter F. O'Connell** who succeeds **William Chapman Foster**, recently appointed director of the U.S. Arms Control and Disarmament Agency.

With the retirement of **Clark W. Davis** after 44 years with DuPont, **Wallace E. Gordon** moves up from assistant to general manager of the Industrial and Biochemicals Department. Gordon in turn was succeeded by **Benjamin F. Schlimme**, formerly planning manager.

Four Metal & Thermit Cor-

poration executives have been designated group vice presidents as follows: **H. E. Hirschland**, Commercial Development and Research Divisions; **B. W. Weber**, manufacturing, employee relations and administration Division; **J. L. Oberg**, Minerals, Ceramics and Welding Divisions; and **D. W. Oakley**, Chemicals, Coatings and Plating Divisions.

Acknowledging the increasing importance of agchemicals, Hooker Chemical Corporation's Eastern Chemical Division has formed a group to handle marketing and development activities in this field. **James S. Walker** was named manager-agricultural chemicals.

**Arthur C. Greber** who joined Richardson Merrell Inc. (formerly Vick) in 1960 as chief of manufacturing services, has been elected a vice president and manager of the company's manufacturing services.

**Milton Nowak** moves up from general manager to vice president in charge of research and production for Troy Chemical Company, manufacturer of anti-microbials and specialty chemicals for the paint and allied industries.

The Dow Chemical Company has shifted **Dr. Julius E. Johnson** from director of agricultural chemicals research to manager of the Agricultural Chemicals Department with responsibility for overall direction of research, development and product planning in the agricultural field. He succeeds **J. W. Britton**, agchem manager since 1949, who will serve on special assignment in executive research for the next year.

A veteran of 35 years with Koppers Company, Inc., **A. B. Fisher Jr.** has been named chief engineer of the Engineering and Construction Division.

**Dr. Roger W. Strassburg** is now manager, research operations, at The B. F. Goodrich Company's Research Center,



*Hidden conduits carry the wires that keep the Pentagon humming, one of the many structures built with steel conduits made by Walker Brothers, Conshohocken, Pa. Other installations include: Rockefeller Center, Yankee Stadium, Time-Life Building, N.Y.C.*

## Sel-Rex Rectifier Helps Walker Brothers Meet Up-To-The Minute Delivery Schedules!!

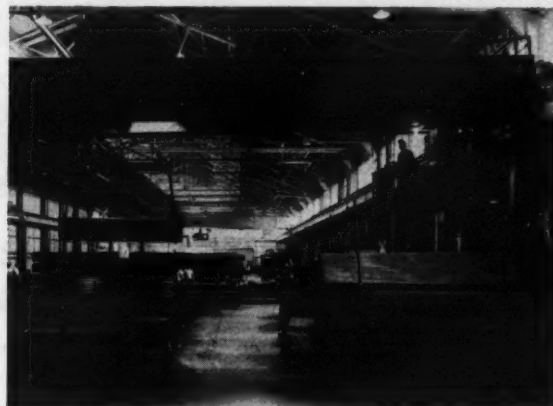
The Pentagon, as with many modern structures, is honeycombed by thousands of Walker Brothers conduits and ducts that carry miles of telephone, dictaphone and low voltage electrical wiring.

Getting these tons of rigid steel conduit to the initial construction site calls for adherence to precise building schedules—timing deliveries to meet contractors' hoist schedules. Otherwise costly delays result; deadlines are disrupted.

Walker Brothers Conduit Division, Conshohocken, Pa., assures on-time deliveries with the help of a Sel-Rex Silicon Rectifier. It powers the plant's giant overhead cranes that lift, haul and load tons of steel every day.

The rectifier was chosen for a special reason: when the company's motor generator suffered a breakdown, a virtually complete production shutdown resulted. To prevent a recurrence, Walker selected a Sel-Rex Rectifier to supply its D.C. requirements . . . chosen because "it has no rotary parts to wear out, has low installation cost, negligible maintenance and low operating cost."

These statements from a Walker Brothers official make good sense. They are the same sound reasons why thousands of firms have chosen Sel-Rex Rectifiers as their modern, trouble-free source of dependable D.C. power.



*Tons of steel conduit made at the Conshohocken, Pa. plant of Walker Brothers are carried by overhead cranes powered by a Sel-Rex Silicon Rectifier.*

Send for Free "GUIDE" to Industrial Rectifier Equipment

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SUBSIDIARY OF SEL-REX CORPORATION

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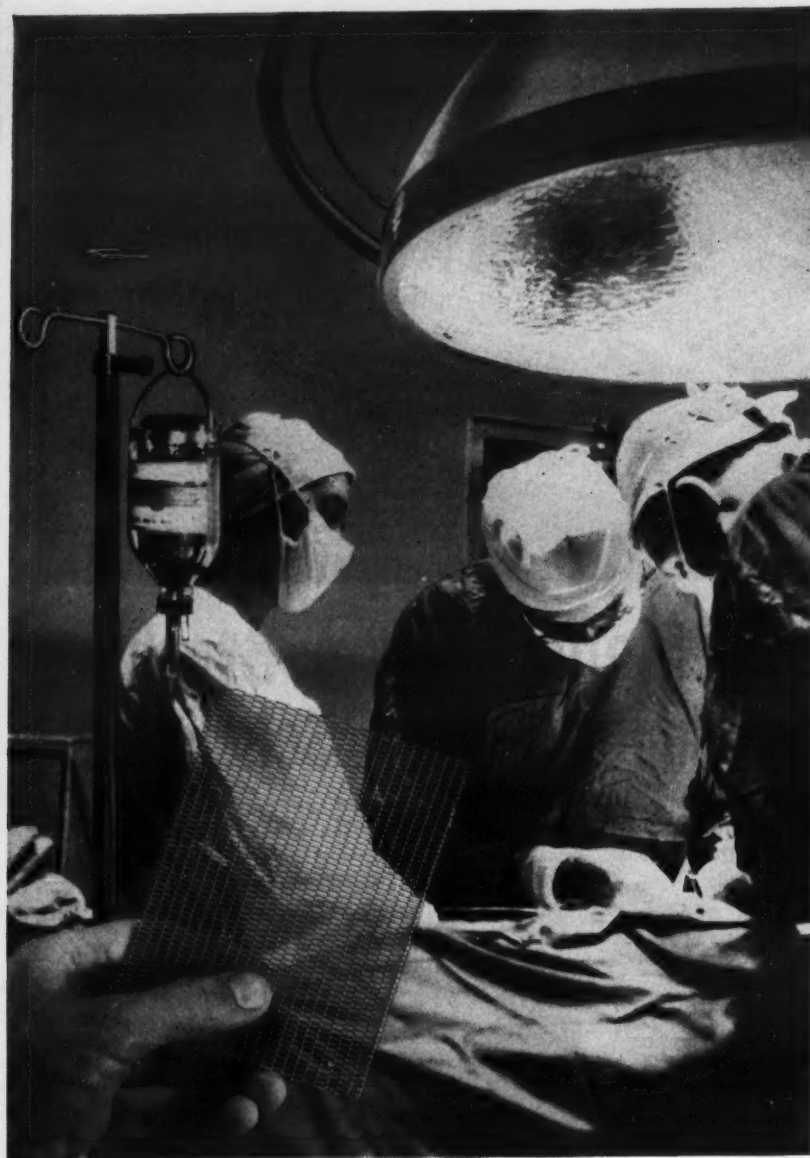
Factories and Offices Chicago 50, Ill., Los Angeles, Cal. and Nutley 10, N. J.

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Check 2089 opposite last page.





## TYLER STAINLESS WIRE CLOTH "BREATHES" AIR INTO BLOOD

A unique "Heart-Lung" machine is now used to re-circulate blood to patients undergoing heart operations. In order to aerate the blood with oxygen, it is cascaded over a series of stainless steel wire screens, produced by Tyler. From hundreds of types of Tyler wire cloth evaluated, a Ton-Cap weave (No. 538) proved to have the best characteristics and is now a world-wide standard for this application. Tyler helps you on unusual applications with industry's broadest line of woven wire cloth.

**TYLER CUTS YOUR COST OF SCREENING** • Requirements matched from world's broadest line of wire cloth • Fast shipments from the industry's largest inventory • Technical service backed by unique Customer Service Laboratory.

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### MAN WITH 50,000 SAMPLES

Tyler field engineers can carry only a representative group of wire cloth samples—but they are backed by over 50,000 specifications in different types, sizes, metals, meshes, and designs. Tyler produces world's broadest line of wire cloth—your assurance of unbiased recommendations and exact matching to your needs.



### FILTERS IN SPECIAL METALS LICK CORROSIVE PROBLEMS

Wire cloth is tailor made by Tyler in a variety of special metals—stainless steel, aluminum, Monel, in addition to more common materials. Tyler controls the design of all metals and alloys used in weaving; processes all its own non-ferrous and many stainless steel wire. Complete range of fabrications available.



## PEOPLE

Brecksville, Ohio, filling the vacancy created by the shift of **Dr. Charles H. Stockman** to vice president and general manager of Goodrich-High Voltage Astronautics, Incorporated.

While continuing in his post as chairman of the chemistry department at Texas Christian University, **Dr. H. B. Hardt** is assuming the duties of director of research and development for Worth Chemical Products Company.

**Floyd B. McCoy** has been promoted from general manager of furnace plants to assistant to the vice-president-production, Victor Chemical Works, division of Stauffer Chemical Company. He is succeeded as manager of furnace plants by **Vern Streitmatter**. **J. Henri Bayle Jr.** has joined Stauffer as refinery superintendent of the Green River, Wyoming, soda ash refinery, currently under construction. The refinery is expected to have an 180,000-ton/yr capacity when placed in full operation in mid 1962.

**William C. Quinn**, formerly with Merck & Co., Inc., has been named director of engineering, Fairmount Chemical Co., Inc.

Newly-named plant managers at Union Carbide Chemicals Company are: **Donald M. Rupert**, Niagara Falls, N.Y., plant, and **James M. Elliott**, Whiting, Ind., plant. Rupert succeeds **Arnold T. Anderson** who has joined the company's marketing department in New York City as product manager-water soluble chemicals. Elliott succeeds **R. T. Bradley**, transferred to Union Carbide Olefins Company, New York City.

**W. R. Grace & Co.** has conferred for the first time the title of "research associate" to **Dr. Nelson Marans** and **Dr. Arthur D. Ketley** of the Research Division. Dr. Marans specializes in the field of radiation chemistry, while Dr. Ketley works in the field of polymer synthesis.

Check 2090 opposite last page.

THAT'S  
INTERESTING

**King-size  
tungsten**

Single tungsten crystals as large as 10" long and 0.22" in diam with a purity of 99.9975% are being produced by Westinghouse's lamp division at Bloomfield, N.J.

Westinghouse engineers have shown that tungsten, long regarded as a hard, brittle metal, is actually ductile in ultrapure form.

This discovery could lead to use of sizable quantities of the metal in commercial fabrication. Tungsten, with highest melting point and greatest strength of all metals, is particularly attractive for missile uses.

**'Homemade'  
electricity**

Fuel cells may some day put each home owner into the power plant business, AIEE members were told recently.

For more information on product at right, specify 2091 see information request blank opposite last page.



# LOOK INTO... ECO MINILAB PUMPS

Want a rugged little, general purpose, self-priming rotary pump for carboy services, general laboratory operations, pilot plant work? Choose the Eco Minilab.

Offered in Hastelloy\* C with twin impellers and bearings in either Teflon† or carbon, these pumps are suitable for pumping a broad range of clear, non-abrasive media including the most severe corrosives. They operate in either direction and are designed for direct, in-line con-

nection to air or electric motors.

No lubrication or contamination is involved as media pumped is its own lubricant and coolant.

Pressures up to 150 psi. Viscosities to 1500 SSU. Suction pressures from 22" Hg (in water-like fluids) to 26" Hg (in viscous media). Temperatures to 300° F. Ports 3/8" IPS. Flows from .05 to 2.2 gpm.

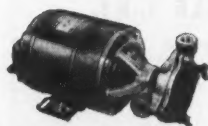
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## ECO

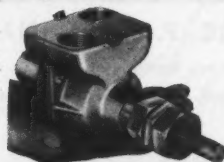
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Write for Literature on any or all of the  
Eco stock pumps shown below for handling  
corrosive or hazardous processing fluids.

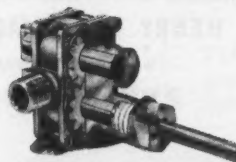
\*Union Carbide Trademark. †du Pont Trademark.



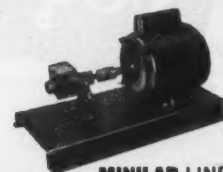
CENTRI-CHEM LINE



ALL-CHEM LINE



GEARCHEM LINE

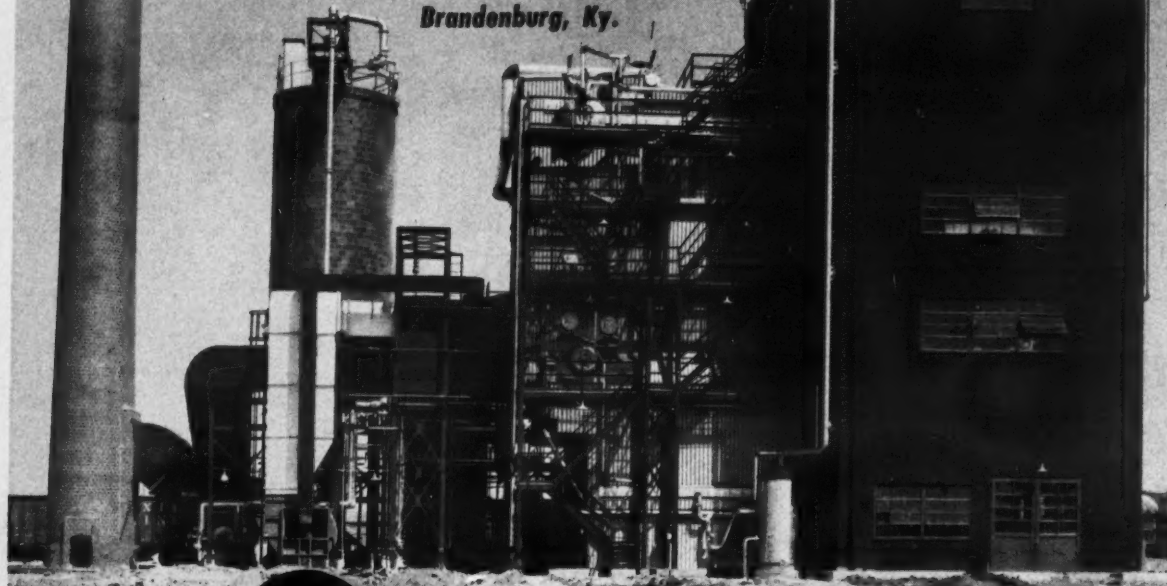


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serves the DOE RUN PLANT of the  
OLIN MATHIESON CHEMICAL CORPORATION,  
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UNIT**  
NOW ON  
ORDER

*Installed out-in-the-open, the unit generates 165,000 pounds of steam per hour at an operating pressure of 650 psig and 750°F. total temperature when firing pulverized coal or gas in a tangent tube, fully water cooled, pressure tight, steel encased setting.*

Outdoor installations, with firing equipment housed, have been promoted by Vogt for many years. They help reduce building and operating costs in leading chemical plants and refineries across the nation.

Contact the Vogt representative nearest you before purchasing new steam generating equipment.

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Check 2092 opposite last page.



### recent books

Prepared by the Armour Research Foundation, this five-volume "Handbook of Thermophysical Properties of Solid Materials" contains 4300 pages dealing with the physical characteristics and behavior of materials at high temperatures. All published data on 12 vitally important physical properties are brought together in conveniently arranged, permanent form.

Included are elements melting above 1000°F, alloys, ceramics, cermets, intermetallics, polymeric materials and composite materials. Each of first four volumes contains explanatory text, index and tables of conversion factors to facilitate use of data sheets and graphs. Fifth volume is a reference guide, listing sources of every item of data found in the Handbook. Authors are listed alphabetically and author and subject indexes are cross-referenced.

To obtain "Handbook of Thermophysical Properties of Solid Materials" remit \$90.00 direct to The Macmillan Company, 60 Fifth Ave., New York 11, N. Y.

Check 2093 opposite last page.

"The Encyclopedia of Microscopy" includes coverage of every aspect of electron, electron-mirror and field-emission microscopy by various authorities. Included are articles from number of outstanding foreign sources presenting microscopic identification of textile fibers, high polymers, plastics and the like. More than 600 illustrations include actual electron micrographs, photographs of modern equipment and diagrams.

Further information on "The Encyclopedia of Microscopy" may be obtained by writing to Reinhold Publishing Corporation, 430 Park Ave., New York 22, N. Y.

"Diaz and Azo Chemistry, Aliphatic and Aromatic Compounds" by Heinrich Zollinger was translated from the Swiss by Harry E. Nursten, University of Leeds, Great Britain. Dealing comprehensively with all phases of diazo chemistry as well as industrial applications, the 444-page volume also presents a voluminous reference section.

To obtain "Diaz and Azo Chemistry, Aliphatic and Aromatic Compounds" remit \$16.50 direct to Interscience Publishers, Inc., 250 Fifth Ave., New York 1, N. Y.

Check 2094 opposite last page.

Introduction to Chemical Engineering — is a 364-page book designed primarily for beginning students in the subject. The book's nine chapters attempt to answer

the questions: What are the duties of a chemical engineer, what tools does he use and what are the products of his efforts? It does this very nicely . . .

Written by L. Bryce Andersen, University of Nebraska and Leonard A. Wenzel, Lehigh University, the book is well illustrated with tables, charts and drawings. Computations are easy to digest. Unsteady-state as well as steady-state mass and energy balances are presented. Computer programming is also discussed. An up-to-date coverage of the growing organic and petrochemical fields is given.

To obtain "Introduction to Chemical Engineering" remit \$9.50 direct to McGraw-Hill Book Company, Inc., 330 West 42nd Street, New York 36, New York.

**Asphalt**, from chemical composition through production and use, receives a concise, logical presentation in 294-page volume. Titled "Asphalt: Its Composition, Properties and Uses," book is directed to engineers, chemists, technologists, and students in the field of bituminous technology.

To obtain "Asphalt: Its Composition, Properties and Uses" remit \$10.00 direct to Reinhold Publishing Corp., 430 Park Avenue, New York 22, N.Y.

**Development of radiation chemistry** is proceeding very rapidly with many areas still in the throes of change. One topic has achieved a degree of order and understanding that permits summary treatment. This is the field of "The Radiation Chemistry of Water and Aqueous Solutions", a 204-page volume by Augustine O. Allen, Senior Scientist, Brookhaven National Laboratory. Areas covered include chemical reactions, various types of high-energy radiation and how this energy is delivered to matter, how experiments on chemical effects of radiation may be conducted and a summary of observations of the radiation of solutions of organic substances.

Intended for the reader who has some knowledge of chemistry, but not well versed in the properties of high-energy radiation, the book should be a valuable aid to chemists, biologists and engineers charged with research in this or allied fields.

To obtain "The Radiation Chemistry of Water and Aqueous Solutions", remit \$6.00 direct to D. Van Nostrand Company, Incorporated, 120 Alexander Street, Princeton, New Jersey.

Check 2095 opposite last page.

**Crystalline aluminosilicates**, known as molecular sieves, have been used in increasing quantities during the past several years. "Molec-

## CHECKUP on your Control Valves... CHECKOFF these Annin Advantages\*



**\* Any other source might give you a few... but with Annin you get them all!**

**MINIMUM** number of parts per complete valve.

**OVER 60,000** successful case histories of split body valve applications.

**POSITIONING ACCURACY** guaranteed, .001 inch per inch of stroke.

**CONSTANT INSTRUMENT** signal sensitivity throughout signal range.

**COMPLETE INTERCHANGEABILITY** of any Domotor valve to on-off pneumatic control, pneumatic hydraulic, electro hydraulic, electro pneumatic or manual actuator.

**ENGINEERED FOR MANUAL** control with any of the above automatic actuators, if desired, at minimum cost.

**SIMPLIFIED ADDITION** of high speed booster units to any pneumatic positioning actuator.

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**BODY SIZES** from 1/4" up.

**COMPLETE LINE** of body ratings: 600—1500—2500 lbs. ASA; special 10,000 and 60,000 psig design, temp. —450°F to 1600°F.

**CONVERSION FROM** globe body to angle body construction with only one additional part.

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**MINIMUM COST** for change from soft seat construction to hard seat, or vice versa.

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Montebello, California

*Annin* VALVES

*First in a series of checklists on Annin features.*

Check 2096 opposite last page.



## U.S. Gypsum installs 24 Sweco separators in 16 plants

United States Gypsum Company's experience with sweco Vibro-Energy\* Separator performance ranges over 10 years and a variety of demanding applications. As a result of proved efficiency, economy and versatility, another sweco unit was selected for installation at its recently completed, modern New Orleans quicklime facility. Also, the "turnkey" contract for design, engineering and construction was awarded to Southwestern Engineering Company.

This single-deck, 48" diameter sweco unit is equipped with a  $\frac{3}{8}$ " clear-opening screen cloth for processing cal-

cined clam shells. Material runs from fines to 2" pieces, at 100-150°F and 58-60 lbs. per cu. ft. High capacity throughput with no screen blinding yields low operating and maintenance costs. Simplicity of design and lack of transmitted vibration required minimum space and structural support. For full details, application data, or free screening demonstration in your plant with your materials, write SOUTHWESTERN ENGINEERING CO., 4800 Santa Fe Avenue, Los Angeles 58, Calif. Department 35-3.

✦ Vibro-Energy separators, grinding mills, finishing mills ✦



## RECENT BOOKS

ular Sieves" by Charles K. Herah, Senior Engineer, Armour Research Foundation of Illinois Institute of Technology, reviews known information on the use of natural and synthetic crystalline zeolites in separating both gaseous and liquid components. Phenomenon of adsorption and commercial utilization of the synthetic zeolites is explored with additional data given to help engineers design adsorption units.

To obtain "Molecular Sieves" remit \$6.50 direct to Reinhold Publishing Corporation, 43 Park Avenue, New York 22, New York.

**Recent advances in heat and mass transfer processes** are presented in 404-page book. Edited by J. P. Hartnett, University of Minnesota, the volume consists of a selection of 15 outstanding technical papers authored by experts in this fast-moving field. The book is designed for use by practicing engineers and researchers as well as a text for advanced studies.

To obtain "Recent Advances in Heat and Mass Transfer" remit \$9.75 direct to McGraw-Hill Book Company, 330 West 42nd Street, New York 36, N. Y.

**Filtration** — as applied to the separation of solids from liquids — is covered in 353-page book. Written by George D. Dickey, consultant, the 15 chapters give an up-to-date picture of field today. Design and construction of the various classes of modern filters are presented and illustrated. Operating practices are discussed. An application section deals with selection of filters for specific uses. A brief history of filtration and a listing of terms commonly used are also included.

To obtain "Filtration" remit \$12.00 direct to Reinhold Publishing Corporation, 430 Park Avenue, New York 22, New York.



"Just a minute there..."

Check 2097 opposite last page.

**THAT'S  
INTERESTING**

**Diagnoses  
by computer**

The entire medical diagnostic process can be converted into mathematical models. These can then be programmed into a computer which then aids in the formulation of a rapid and precise judgment of the patient's illness.

Robert S. Ledley, president of National Biomedical Research Foundation, proposed this application for computers during the 1961 Computer Applications Symposium at Chicago.

**Lightweight  
subs seen**

A different approach to welding titanium alloys may make it possible to fabricate submarine hulls of this metal.

Titanium alloys are as strong as many steels but weigh only two-thirds as much.

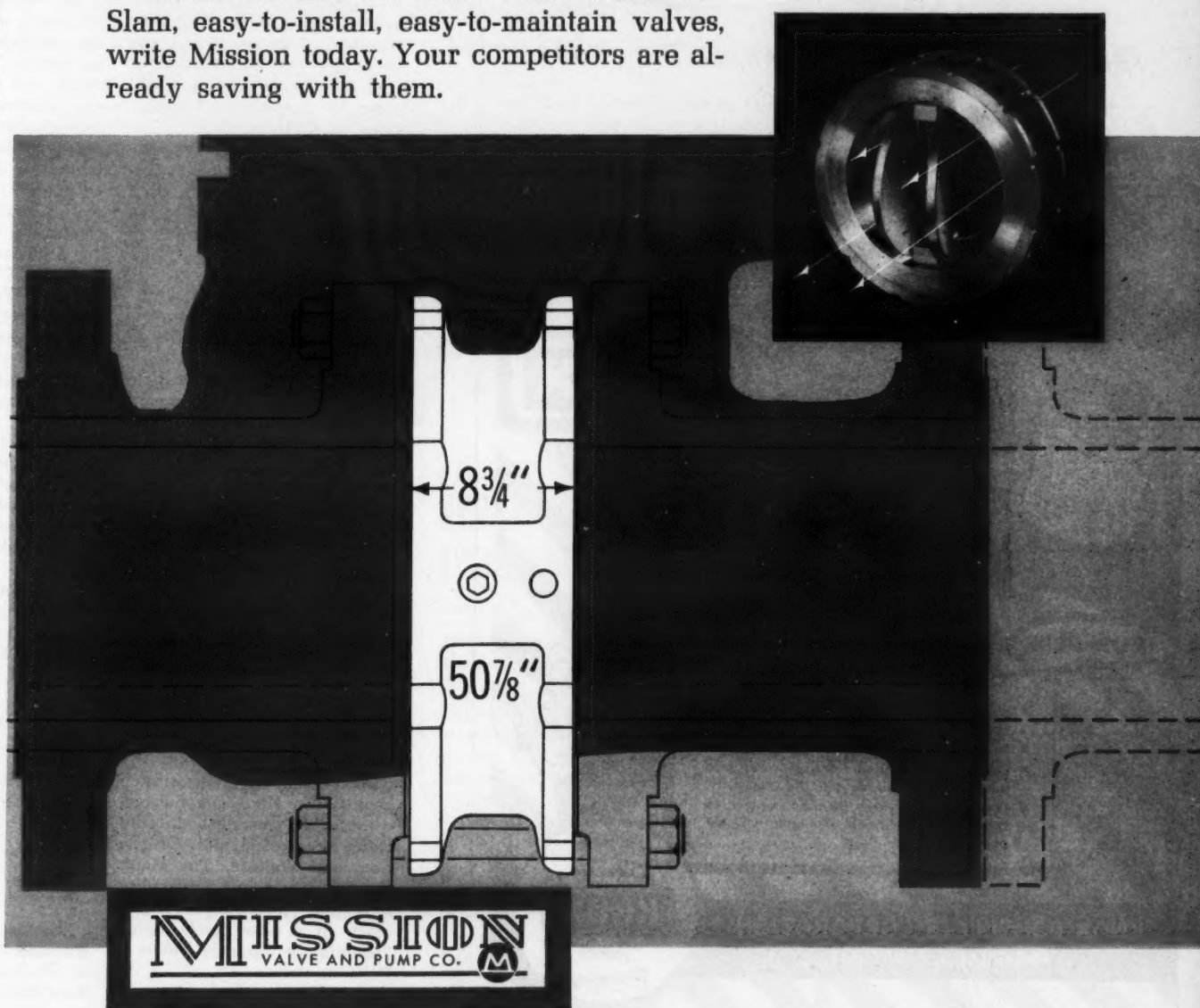
For more information on product at right, specify 2098 see information request blank opposite last page.



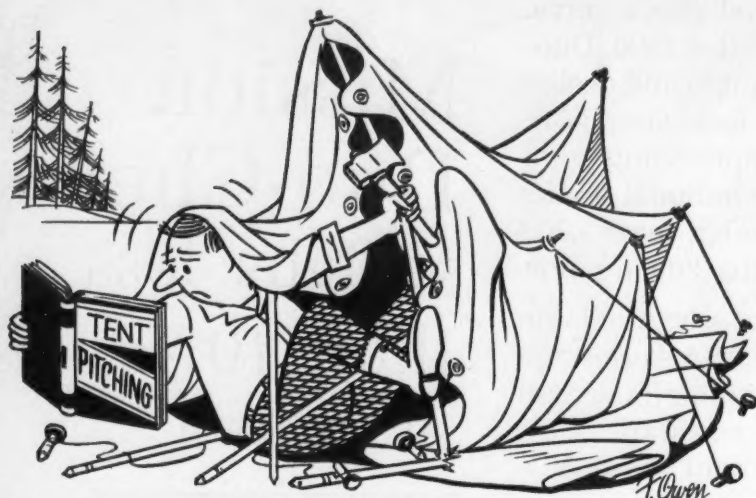
The illustration compares a 10-inch Duo-Chek Check Valve with a conventional check valve. In one application a 10-inch, Series 2500, Duo-Chek, which meets all ASA strength and design requirements except face-to-face size, is in continuous operation on a reciprocating compressor discharge line. A conventional swing check in this service would weigh over 5,000 pounds. The Duo-Chek weighs 285 pounds.

Here are some more quick facts: Available in sizes from 2 to 48 inches, ASA series 125 through 2500, in steel, stainless, aluminum, and bronze. Corrosion and heat resistant seals available. To find out more about these NO-Slam, easy-to-install, easy-to-maintain valves, write Mission today. Your competitors are already saving with them.

**Mission  
Duo-Chek  
weighs less  
than 10%  
as much**



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**Becco Chemical Division**

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It takes experience to determine the best way to handle  $H_2O_2$ . Becco's got it. Why not take advantage of Becco's fourfold engineering service, offering survey, proposal, installation and inspection. No obligation, of course.

Check 2099 opposite last page.

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Single-Partition Ring

Cross-Partition Ring

**IRON FREE**

**Tower Packings**

- KNOX Tower Packings resist high temperatures, fumes, vapor, corrosion.
- Resistant to alkalis, acids, liquids.
- Complete vitrification firing provides zero porosity, assuring indefinite life chemically.
- Uniform quality, high chemical purity, iron free, great mechanical strength, will not crumble.

Berl Saddle

Always Specify  
**KNOX**  
Tower Packings

**KNOX PORCELAIN CORPORATION**  
KNOXVILLE 1, TENNESSEE

Check 2100 opposite last page.



## Watching Washington

### Nuclear-facility mortgages OK'd by Atomic Energy Commission

Chemical processors now can borrow money against nuclear reactors and other facilities licensed by the Atomic Energy Commission. Such loans must be approved by the AEC, and the lender must meet the same licensing requirements that apply to the licensee.

The Atomic Energy Act has provided for mortgaging facilities subject to specific AEC approval. The AEC has amended its regulations to grant general approval. The amendment also sets up precedures for enforcement of creditors' rights against licensed facilities, the transfer of licenses, and the surrender and termination of such licenses. It is an "amendment to Commission regulations, 10 CFR Part 50."

Chemical industry supervisors whose departments include nuclear reactors soon may have to be licensed by the Atomic Energy Commission. Reactor operators already are licensed.

The employment of technically qualified supervisors always has been a condition of issuance of a facility license, and most supervisors also hold operators licenses. However, there has been no regulation requiring supervisors to be licensed as are operators.

The AEC reasons that since "supervisory operators" direct operations and exercise judgment that may influence safety or health, they should be required to pass an examination. Under present plans, such an examination would require knowledge of reactor operations beyond that required of operators.

The National Clearinghouse for Poison Control Centers and the Food and Drug Administration have appointed Dennis the Menace a poison-prevention specialist in the Department of Health, Education, and Welfare. The Hank Ketcham cartoon personality tells the poison-prevention story in a new comic book, "Dennis the Menace Takes a Poke at Poison."

The book appeals for the proper use and storage of hazardous substances on behalf of accident victims.

The message is aimed at educators and information media. Distribution of the book is mainly to health departments and other public agencies. However, it is also available at cost to manufacturers of pharmaceutical supplies, household and garden chemicals and other products, as well as non-profit groups. Information is available from the Division of Accident Prevention, U.S. Public Health Service, Washington 25, D.C.

The Atomic Energy Commission has made available five new research reports on waste disposal and processing. All are available through the Office of Technical Services, Business and Defense Services Administration, U.S. Department of Commerce, Washington 25, D.C. They are:

"Research and Development Studies on Waste Process," May 1961, 131 pp, IDO-14504, \$2.50.

"Pneumatic Atomizing Nozzles in Fluidized Bed Calcining, Part I, Calibration Tests," May 1961, 29 pp, IDO 14-548, 50c.

"Low Exposure Method for Disposing of High Activity Wastes," June 1961, 12 pp, LAMS-2566, 50c.

"A Phenolic Resin Ion Exchange Process for Decontaminating Low-Radioactivity-Level Process Water Waste," June 1961, 28 pp, ORNL-3036, 75c.

"Report of the Second Working Meeting on Fixation of Radioactivity in Stable, Solid Media," Idaho Falls, Idaho, September 27-29, 1960, February 1961, 789 pp, TID-7613 (Bks 1&2), \$8 (set).

## THAT'S INTERESTING

### Rocky road to water

The first astronauts to visit the moon may obtain drinking water from rocks.

Dr. Roy G. Brereton of Aerojet-General, believes rocks, known to contain up to 5% water, are available on the moon.

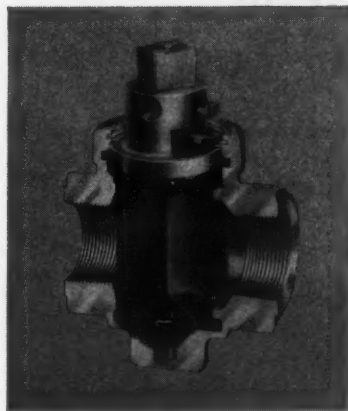
Spacemen could "milk" the rocks by using a mirror to focus the sun's heat to 1500° F. This heat, aimed at the rocks, would cause the water to rise as steam which could be caught, condensed and used.

### 'Tail light' synthesized

Luciferin, the substance that lights the tail of the firefly has been synthesized by scientists at Johns Hopkins. It is being made in gram quantities.

This development will aid scientists in learning how the body converts food into energy.

For more information on product at right, specify 2101 see information request blank opposite last page.



## BROKEN GLASS AND PAPER WON'T CLOG THIS VALVE

### **W-K-M** **ACF** Non-Lubricated EC Plug Valve

Many valves were tried for the tough job of controlling the flow of a caustic washing solution that often contained bits of bottle glass and labels, but W-K-M's EC Plug Valve was the only one that could do the job successfully.

We admit this is a problem you don't run into every day, but it's a good indication of the effectiveness of the W-K-M EC Plug Valve. Whatever type of service this valve is applied to it gives a tight seal that can be adjusted on the line when wear develops. Further it excels in the handling of solid bearing liquids or gases since its elastomer coated plug resists even severe abrasive action. The W-K-M EC Plug Valve requires no regular maintenance since it is non-lubricated.

Write for specification sheet AE-1061 for full details.

WHEN SO MUCH DEPENDS ON A VALVE...SPECIFY



**W-K-M**  
DIVISION

**ACF INDUSTRIES**

P. O. BOX 2117 HOUSTON, TEXAS



letters from readers

### Making the transition from books to practice

Sirs:

May I offer my congratulations on an excellent presentation, "The chemical engineering-scientist and how he got that way" in August *CHEMICAL PROCESSING* (p. 25). You have forcefully presented to the businessmen who read your magazine a problem which they must face in the near future. This type of information will ease the strains which are inevitable as our newer graduates join the older men in industry trained in older fashion.

I feel it might have been helpful to them if you had mentioned the two new unit operations books which are being rather widely used in training of their new recruits. I am sure you know of our Lehigh efforts, *Principles of Unit Operations*, and the excellent Wisconsin production to the title *Transport Phenomena*. As you will recall, you gave our book a presentation in your July 1960 issue ("Chemical engineering catching up?", p. 23).

For two reasons, I hope the industrial response to your article is sufficient to justify a follow-up from a different point of view. One is how much more such modernization should be done in our textbooks.

Much more important, however, is the problem of the smoothest bridging of the gap between these new graduates, very strongly trained in theoretical matters and their older supervisors on their early jobs, who were trained to a distinctly different goal, and most of whom have had no reason to go back to fundamentals and keep up with these developments.

I anticipate some very rough spots for our new graduates, and I wonder very frankly if the present group of middle supervisors in the chemical industry knows enough to take advantage of the total knowledge of new graduates.

ALAN S. FOUST, Head  
Dept. of Chemical Engineering  
Lehigh University



## "Bringing in brine by pipe of Geon instead of tank trucks cuts our costs"

"When we used to have our saturated brine delivered daily by tank truck," says the superintendent of the Goodrich-Gulf Chemicals, Inc., plant at Port Neches, Texas, "the trucks created traffic problems and receiving equipment created peak pressures on plant and manpower—often at the wrong time. Now we're sure of a continuous supply of brine with minimum receiving problems."

Texas Brine Corporation likes the new arrangement, too. Since laying 12,000 feet of rigid vinyl pipe, their cost of delivery has been reduced to the cost of automatic pumping.

The pipe was easy to install, too. No wonder. Geon

pipe is lightweight, can be joined by solvent welding—as is being done in the photo above. Geon is unaffected by most causes of corrosion—the brine can't harm it, and ground currents or inside deposits will never be a problem. It will continue to provide low-cost delivery for as long as it's needed.

Here's another example of the way that rigid Geon can solve piping problems. In other products, Geon provides whole new advantages, sometimes opens whole new markets. For information, write Dept. NJ-6, B.F. Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, Ohio.

In Canada: Kitchener, Ontario.

## B.F. Goodrich Chemical

a division of The B.F. Goodrich Company



Check 2102 opposite last page.

**To provide the maximum opportunity for creativity,  
to find the unusual solution to a tough plant problem,  
cross-fertilization of ideas from the sciences and  
industries other than one's own is vital. That's why you  
should attend joint conferences, talk to many types  
of specialists and, in addition,**

## Don't neglect reading outside your field

### CP STAFF REPORT

**INFORMATION RETRIEVAL** provides a useful service but is not of value to the man who is looking for ideas and who cannot precisely define just what it is he is seeking. Hence, rather than read fewer magazines, such an individual might well read more magazines. He should not neglect articles in fields other than his own.

For example, an oil refiner can pick up tricks from the steel industry, an instrument man in the chemical field might profitably read aerospace publications. Our own publication, **CHEMICAL PROCESSING**, has tried to anticipate this need by publishing articles about developments originating in other fields. Examples are the articles on cryogenic instrumentation and mass flowmeters appearing in September CP, both of which owe much to space technology.

Certainly, more information about every subject is available than ever before. Sheer

volume of material forces some readers into ever-narrowing peninsulas of specialization. The irony of this is that it is on the land between the peninsulas that the dramatic breakthroughs in science and technology are found.

Both biology and physics are rampant with specialists who seldom communicate even with other biologists or other physicists, but it is in the area between — in biophysics — that the really important advances on knowledge are taking place.

We need to ignore tradition-

al boundaries. This is the key to successful programs in methodically stimulating the technical cross-fertilization of a man whose job will be to make imaginative new advances. This is the thought emphasized constantly by a man who has devoted 25 years to planned stimulation of major breakthroughs. He is Dr. Frank Fremont-Smith, director, American Institute of Biological Sciences interdisciplinary conference program.

The AIBS program has been operating less than a year, but Dr. Fremont-Smith is world

renowned for his success with the widely discussed Macy Conferences — interdisciplinary conferences on medical problems sponsored by the Josiah Macy, Jr., Foundation. From these conferences have come many technical breakthroughs, many startling new ideas. Best known is the development of cybernetics, man-machine relations, by the mathematician Norbert Wiener, following his participation in a Macy Conference.

Behind Dr. Fremont-Smith's conferences is the thought that "the rate of scientific advancement may be greatly slowed because so many scientists fail to deal operationally with the inherent unity of nature." He urges scientists and engineers to remember that the niches labeled "chemistry" or "biology" are not recognized by nature; they are compartments adopted by universities out of administrative necessity.

Interdisciplinary communi-

The niches labeled "chemistry" or "physics" are not recognized by nature. If a scientist or engineer fails to understand the inherent unity of nature, progress may be greatly slowed, according to Dr. Fremont-Smith, pioneer in interdisciplinary communication.

## DON'T NEGLECT READING OUTSIDE YOUR FIELD

cation, however, needs more for success than the mere intermixing of a few representatives from two fields. Conference specialists are needed to aid in planning. Participants should be selected with the view of overcoming language barriers.

### Oral Communication Can Be Valuable

Also interested in interdisciplinary communication is another AIBS group. It is the biological sciences communication project directed by Dr. Charles W. Schilling, former chief of biological sciences for the Atomic Energy Commission and monitor of nuclear weapons tests at Eniwetok Atoll.

Dr. Schilling recognizes, as do other information authorities, that more and more technical and managerial people are turning to oral communication to solve their information pile-up problems.

Oral information exchanges

are being studied as part of Dr. Schilling's project. He will attempt to evaluate not only the symposium and conference, but also the hallway conversations that take place at meetings. More and more, authorities on information dissemination are pointing up to the "bull session" as an effective means of communication.

Dr. Fremont-Smith, who cooperates with Dr. Schilling on his project, believes that some of the most valuable discussions at conventions take place in the bar. "Let's not fight informal discussion; let's bring conversation from the bar to the convention hall," he suggests.

Dr. Schilling hopes to be able to develop some technique by which he can measure the impact on creativity of having information spoon-fed by information retrieval. He wonders whether browsing among the magazines might not be a necessary stimulus to creativity. For that matter, he feels that the advertisements

might also play a role in the creative process — a role that will go out the window with automatic machine sorting of information.

At this early stage, his thoughts are but hunches. He does not know how to measure the creative difference

ics, geology and astronomy, to mention only a few fields. Here is a man, a chemist, whose homeward-bound brief case never contains only the *Journal of the American Chemical Society*.

Many interviewees mentioned young Donald Glaser,

**When a scientist or engineer seeks data to meet a specific need, an information specialist can get it for him. When he seeks ideas, he has to get them himself — he has to read and browse and often do his hunting far afield.**

between an engineer who is spoon-fed his information and one who browses for it. However, he is keeping the programs flexible enough to follow trails that present themselves.

### Does Mixing of Specialists Really Help?

Is interdisciplinary communication really important to the creative process? Does "cross-fertilizing" of engineers and scientists — mixing biologists and electrical engineers or chemists and astronomers — really get things done?

There is no proof that reading outside of his field helps a man to be more creative, but there is strong evidence that cross-fertilization is an asset.

Running through CHEMICAL PROCESSING's score of interviews on this subject there was one example frequently mentioned. The Nobel Prize, in any field, is generally accepted as a symbol of outstanding achievement. Examine some Nobelists.

Harold C. Urey's interests and achievements are almost in the realm of legend. Nominally a chemist, perhaps because that is the way he lists himself where such data are listed, he has sparked research in, and contributed understanding to, biology, phys-

ics, geology and astronomy, to mention only a few fields. He received his medal in physics. Is Glaser unbending in a narrow pursuit of physics? As he departed for the Prize award ceremony, he announced that he was going to Copenhagen, to enroll as a graduate student — in microbiology.

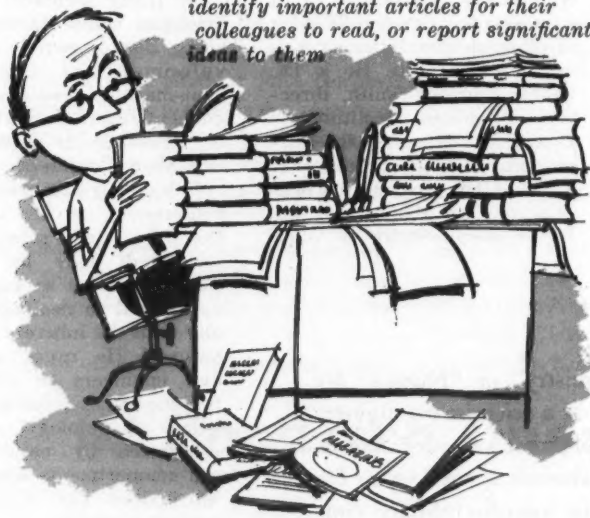
Interviewees repeatedly told CHEMICAL PROCESSING: When a scientist or engineer seeks data to meet a specific need, an information specialist can get it for him. When he seeks ideas, he has to get them himself — he has to read and browse and often do his hunting far afield. This is the real work of problem solving, and nobody else can do it for him.

### Survey Indicates Executives Do Much Reading

A provoking expression of this thought comes from the realm of corporate leadership. In 1957, *Harvard Business Review* examined the reading habits of 1484 top executives. Wrote editor Edward C. Bursk:

"Indeed, if there is anything surprising about top executives' burden of reading, it is that even with the availability of personnel to screen and abstract reading material for them, they still feel they must do much reading firsthand.

*It is difficult to keep up with the growing pile of literature generated by snowballing technology. However, a chemical operating manager may find it necessary to read more magazines, some in fields other than his own, if he is to develop ideas needed for advancements. Some executives divide up among themselves the responsibility for reading various publications, then identify important articles for their colleagues to read, or report significant ideas to them*



I know of one large company where the top executives divide among themselves the responsibility for reading the various magazines, identifying important articles for their colleagues to read or reporting important ideas to them. Their feeling is that no one but a top executive can know what an article will or should mean to men in positions similar to his own."

As an example of the fruits of cross-fertilization, bacteria have been put to work in extractive metallurgy. Low-grade ores are yielding copper, nickel, cobalt, manganese, molybdenum and other strategic materials, thanks to the action of microbes. This is not the kind of discovery that can be made by a metallurgist who sticks rigidly to his own field and to metallurgy's own journals.

The biochemical fuel cell, too, is the result of interests that cut across — ignore — the artificial boundaries of "disciplines," outdated labels. Dr. Frederick Sisler, its inventor, browses through the publications of other areas. He chats with people in other fields. Some people feel that this valuable pursuit could easily be extinguished by machine information systems.

A little browsing in other fields might have put physicists in the ultra-high-pressure gas research business ten years sooner. In order to exceed the 3000 atmospheres to which research was limited at the turn of the century, Percy Williams Bridgman had to devise all new equipment and develop many of the materials from which to make his devices. His key to progress was a special gasket material without which his remarkable 40 years of research would have been impossible.

In 1946, he was awarded a Nobel Prize in physics. In his acceptance speech, the American physicist pointed to the merits of maintaining an inquisitive interest in other fields. The gasket material that he had labored to "invent" before his high pressure research could proceed had been

patented ten years earlier by a sausage machine company! Occasional browsing through other people's literature and perhaps communication across the bounds into engineering and production might have saved Bridgman considerable effort and frustration.

#### Reading Committee Valuable to Members

A National Science Foundation official reports effective interdisciplinary programs in operation at the Naval Electronics Laboratory and Oak Ridge National Laboratory, as well as in several private firms. In each case, each department in the organization appoints a professional scientist or engineer to a tour of duty — usually three months — on a reading committee.

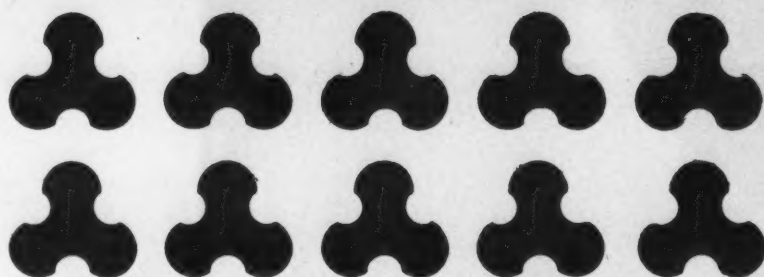
The committee reads all incoming literature — every member sees every piece of literature. Committee members then route pertinent items to colleagues in their departments.

One might argue, this still is a matter of sending reports on high-speed pumps for chemical processes to people who work with high-speed pumps on chemical processes. It is not cross-fertilization, not interdisciplinary communication.

Wrong . . . Every committee member sees every piece of incoming literature. The representative from the engineering service department sees the missile-industry magazines bought for the market-development department. If he spots a device designed for missile making that looks like it might solve problems in process pumping, then it gets expedited delivery to the right man in engineering services — perhaps a man who had never even heard of the missile magazine.

The National Science Foundation official reports that the system works well in practice as it sounds in theory. Some amusement he has had with these programs explains better than formal reports just

To page 51



## New! Redesigned M-D HEAVY-DUTY BLOWERS...

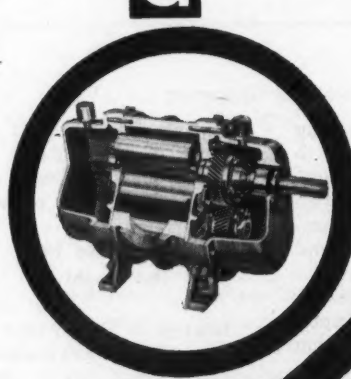
M-D BLOWERS ARE BETTER THAN EVER! 12 new features have been added to make M-D blowers even more rugged and reliable and to guarantee positive oil-free flow under the most severe operating conditions. These improvements plus M-D's exclusive 3-lobe rotor design (which eliminates the possibility of rotor deflection at high speeds) permit operation at constant pressures up to 15 PSIG in single-stage and to 70 PSIG in multi-stage with capacities ranging from 30 to 4000 CFM.

**SPECIFY M-D ROTARY POSITIVE BLOWERS  
FOR: Smallest Cube Dimensions • Widest Pressure Range • GUARANTEED Flow (Factory Tested). Oil-Free Air Flow**

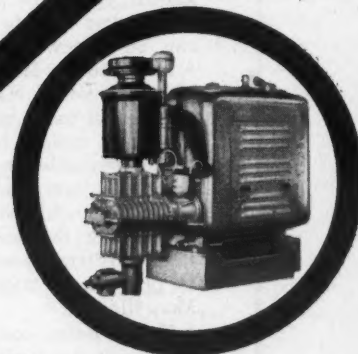


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**M-D BLOWERS, Inc.**  
Racine, Wisconsin



M-D blowers can be  
mounted on any engine



A Subsidiary of  **MEHLE-GOSS-DEXTER, INC.**

Check 2103 opposite last page.



*Tape molds itself to the contour of the threads, protecting them while providing a leakproof joint*

# Teflon pipe-dope tape skyrockets in CPI

Ranking as a major advancement in the construction and maintenance of chemical processing plants, the tape sealant —

- reduces pipe-assembly time
- provides leakproof joints
- permits disassembly & rejoining
- furnishes chemical inertness
- eliminates seizing & galling
- prevents electrolytic corrosion

By GORDON WEYERMULLER, Senior Associate Editor

THE PRACTICE of applying a pipe dope in paste form to threads prior to joining pipe, fittings or valves is well known. Pipe dope paste, however, takes time to apply and can be somewhat messy.

In December 1958, Permacel, New Brunswick, N.J., hit upon the idea of using white Teflon tape as a sealant for threads. Other companies, such as Minnesota Mining, who had Teflon tape, quickly followed suit in pushing the new application. Others soon started to produce it, such as Johns Manville.

Now a dozen companies are offering Teflon tape as a sealant for threads, the amount being used for this purpose having jumped phenomenally.

Companies report 1961 sales of 50% or more above those of 1960 and, in some cases, three or four times higher.

## Why Teflon Tape Has Caught On

Interest in Teflon tape sealant for threads has surged because it furnishes a cleaner, easier way of connecting threaded pipe, fittings or valves, thus resulting in considerable savings in labor and materials.

For example, Du Pont's plant at Niagara Falls has found that by using the tape sealant it can go to lower-cost threaded valves instead of flanged valves for a number of applications. In the past

year and a half, 400 one-inch valves with flanged having threaded ends. The flanged valves cost \$76 each and the threaded valves only \$26 each. Hence, this one plant saved \$20,000 on this application.

The reason Du Pont was able to go to the threaded valves is the leakproof joint furnished by the tape and the fact that Teflon is inert to a large number of chemicals at temperatures from  $-450^{\circ}\text{F}$  up to  $500^{\circ}\text{F}$ . Teflon will withstand such corrosives as aqua regia, fuming nitric acid, hydrofluoric acid, caustic and solvents.

The Niagara Falls plant is using the tape as the sole material for a variety of

pipings installations. It is handling chlorinated solvents, sulfuric acid, hydrochloric acid, natural gas and fuel oil in tape-doped lines. By using the tape to prevent fuel oil leakage, the company has averted a housekeeping problem.

Paul Harold, senior engineer, plant auxiliary equipment, at the Du Pont plant, reports that leaks caused by strong solvents have been eliminated or greatly reduced by going to the Teflon sealant. Thread galling on stainless steel, aluminum and plastic piping has been minimized. Labor costs for assembling and dismantling tape-doped connections have been reduced at the plant.

*In typical installation, tape permits threaded valves to be used in place of more expensive flanged valves, a move which saved one plant \$20,000 in a year and a half's time*

Labor costs for assembling tape-dope pipe are less because Teflon has a low friction coefficient (0.04), which permits connections to be made quickly. Also, joints can be rapidly disconnected and connected again repeatedly without applying new tape, while still maintaining a tight joint.

Another advantage is that the tape tends to minimize electrolytic corrosion in cases where different metals are being connected. Even with the same metal being used, the tape protects the threads, an area highly vulnerable to corrosion. Tape can be used for pressures up to 10,000 psi.

The Teflon tape is not expected to displace completely pipe dope in paste as this still has its place for certain applications. For example, Teflon tape is suitable for temperatures up to about 500°F. If temperatures are higher, another type of sealant may be required.

#### **Suitable for Cryogenic Applications**

The fact that Teflon tape will withstand temperatures of -450°F and is inert, has made it useful for systems handling cryogenic fluids. For example, the largest single application one supplier has in the Chicago area is for oxygen in both the liquid and gaseous form. Since the tape cannot contaminate oxygen, this helps to maintain safety and cleanliness of product.

Cleanliness of the tape also makes it advantageous for use

around food products. Good sealing characteristics enable tape to be useful for piping systems handling hard-to-hold liquids such as Dowtherm, ethylene glycol, ethers, esters and halogenated solvents.

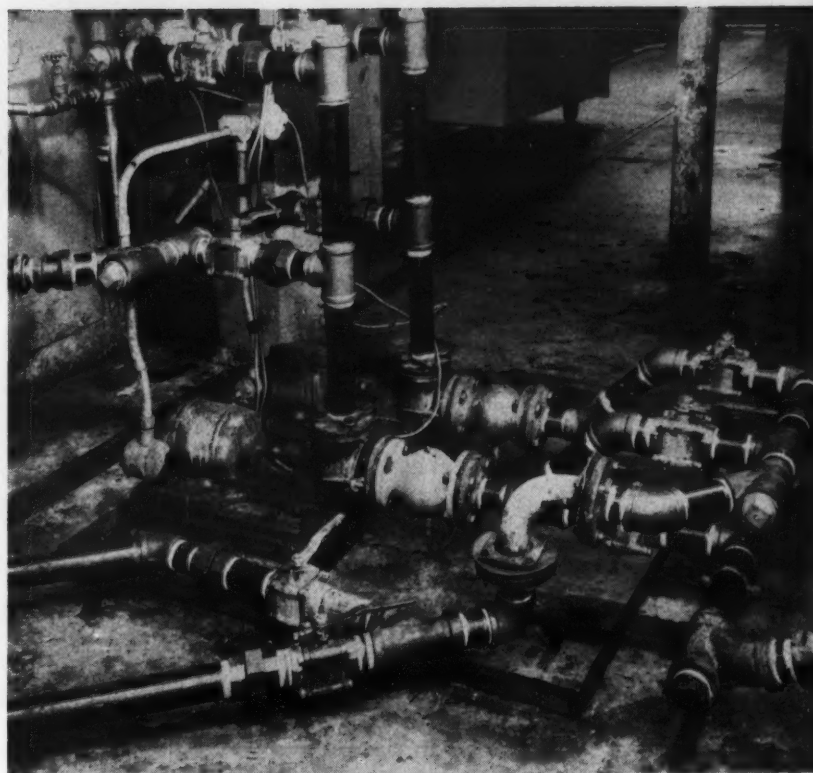
#### **Suitable for Other Threaded Connections**

In addition to piping, fittings and valves, the tape has been found to be useful for such things as threaded drum bungs. Threaded gages and instruments can utilize the tape to advantage. It can also be used on studs and bolts which must be removed frequently for maintenance, such as calandria head bolts.

In the installation of electrical motors, a single wrap of tape on the bolt threads will make it easy to remove the nut at a later date. A lock washer is recommended for such installations. Another similar application is one in which heavy nuts and bolts are used to hold hydraulic cylinders together.

Tape used for sealing threads is made of unfused tetrafluoro-ethylene resin. Usual thickness is three to four mils.

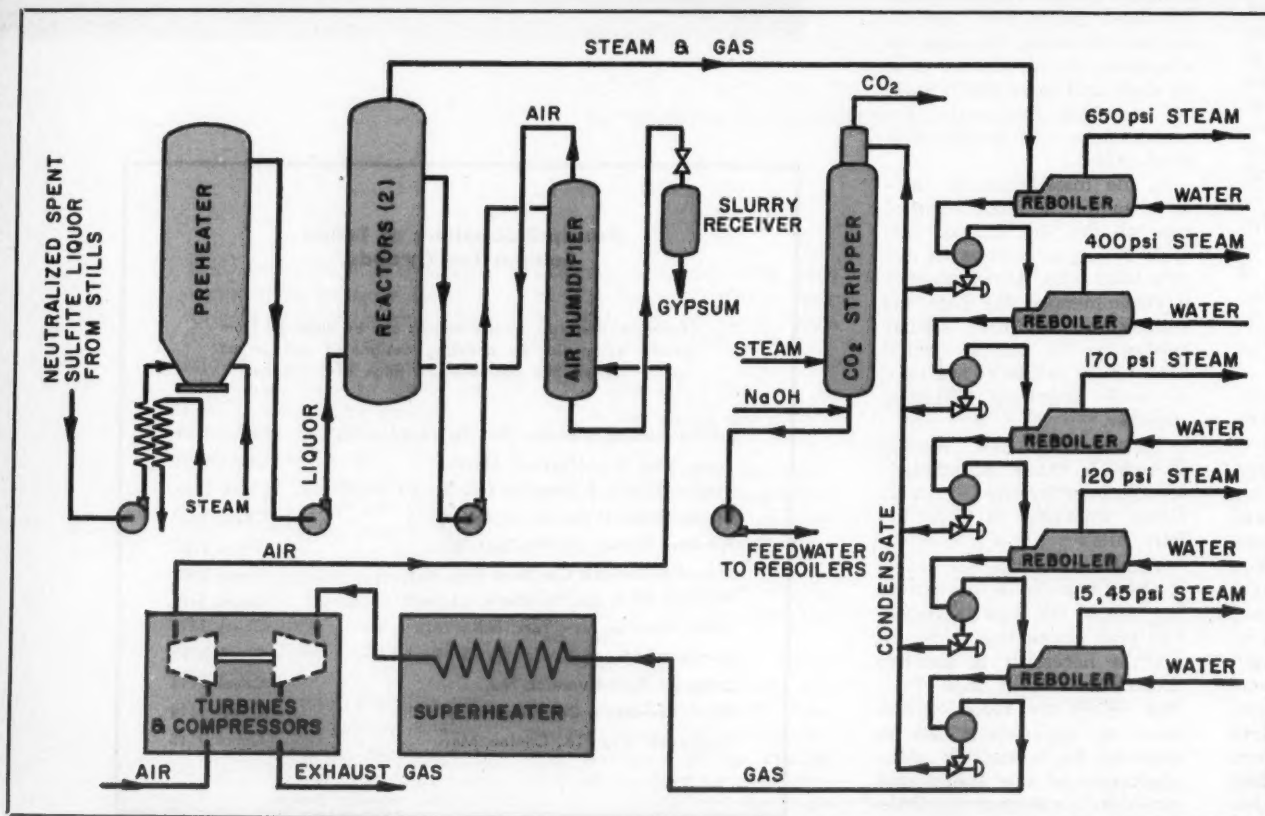
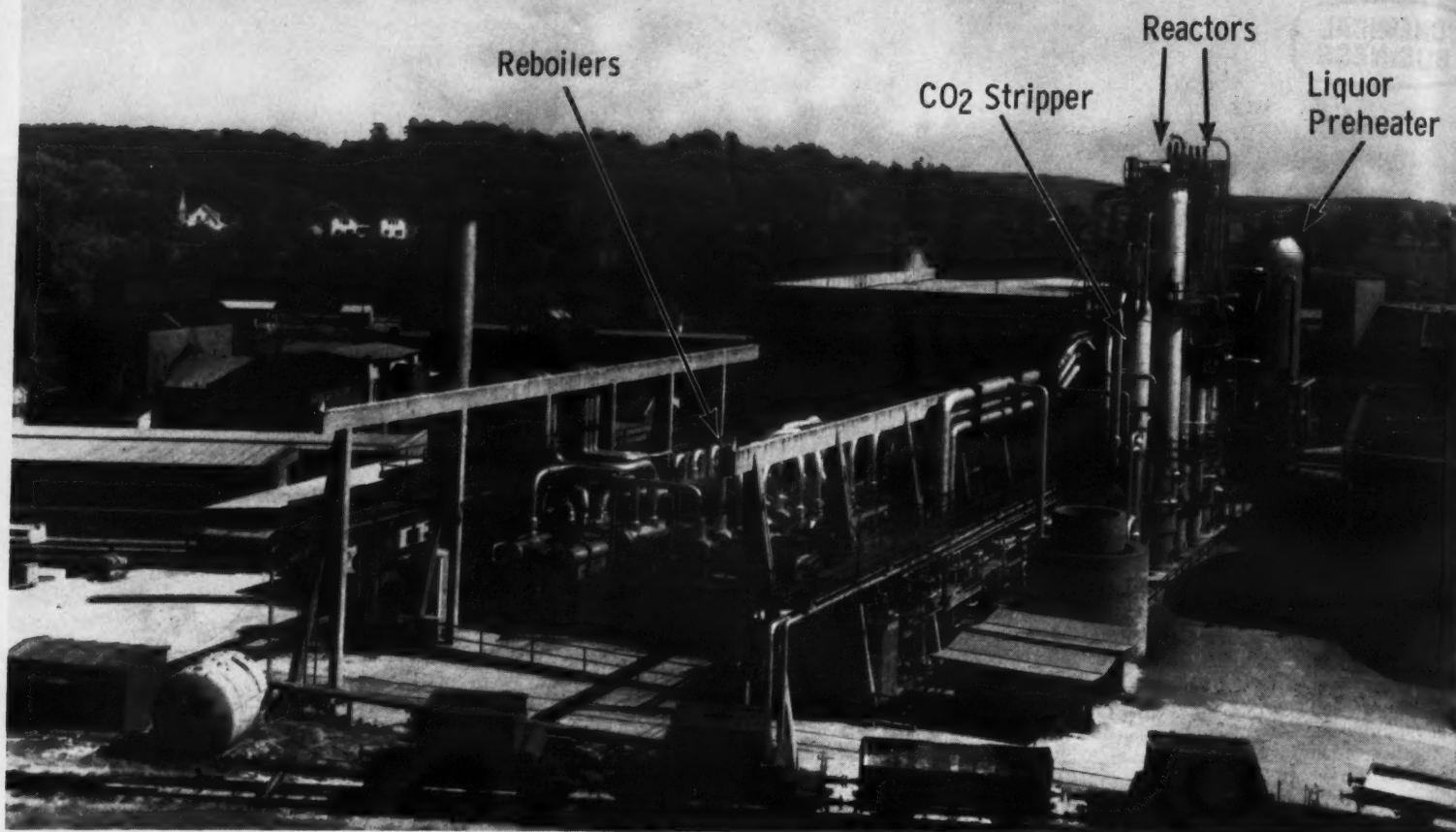
When the tape is used, thicker material is needed as the size of the pipe increases. For pipe above two inches, it may be necessary to use two thicknesses of the tape. Further details and recommendations on applications can be obtained by contacting manufacturers of the Teflon tape given in accompanying table.



#### **Principal Suppliers of Teflon Sealant For Threads**

(Technical literature or information can be obtained from specific companies by checking designated number on Reader Service Slip opposite last page of this issue.)

Belmont Packing & Rubber Co., Philadelphia, Pa.	Check 2104
Bonny Mfg. Co., Maynard, Mass.	Check 2105
Cadillac Plastics & Chemical Co., Detroit, Mich.	Check 2106
Kraloy/Chemtrol Co., Santa Ana, Calif.	Check 2107
Friesland Plastics Co., Friesland, Wis.	Check 2108
Hercules Chemical Co., New York, N.Y.	Check 2109
Hi Temp Wires Co., Westbury, L.I., N.Y.	Check 2110
Johns Manville, New York, N.Y.	Check 2111
Minnesota Mining & Mfg. Co., St. Paul, Minn.	Check 2112
Permacel, New Brunswick, N.J.	Check 2113
W. S. Shamban & Co., Culver City, Calif.	Check 2114
Surprenant Mfg. Co., Clinton, Mass.	Check 2115



Arrows indicate location of equipment for wet-oxidation process which burns waste sulfite liquors at Borregaard Paper Company in Sarpsborg, Norway

Spent sulfite liquor, after first being fermented and distilled to make alcohol, is burned and turned into process steam by route shown. Gypsum is produced as by-product

# • burns sulfite liquors with minimum odor • supplies half of pulp mill's steam needs

**'Wet air combustion' waste-treatment process will generate  
220,000 lb steam per hour, save plant 16 million gal fuel  
oil annually, produce 40,000 tons per year of gypsum as byproduct**

With stricter enforcement of anti-pollution measures a certainty, it is not surprising that the Zimmermann wet air combustion process is getting the close attention of chemical processing companies. The unique method holds out hope of greatly reducing that "irreducible overhead" of waste-treatment operations.

Although much has been written about the use of the process for municipal sewage treatment, it was originally developed by F. J. Zimmermann for the treatment of waste sulfite liquor at Salvo Chemical Corporation, Rothschild, Wis. One of the first commercial installations was a 40-ton-per-day unit installed at Hammermill Paper Company in Erie, Pa. The Norwegian installation described in this article is another pulp-and-paper installation, this one handling waste from a 500-ton/day mill.

The process has sizable potential in the processing field, not only in the paper industry but for such wastes as those coming from petroleum refineries or pharmaceutical plants. The process rates investigation for any oxidizable waste material that stays dissolved or suspended in water. Small ( $\frac{1}{2}$  to 2 tons dried sludge per day) units recently made available may also prove useful in the processing field.

GETTING RID of waste black liquor is a problem that has long plagued paper mills. Stream dumping — a common practice in the past — is very much frowned upon today.

Strict water anti-pollution laws have been passed (see **CHEMICAL PROCESSING**, Oct. 1961, p. 30), and mills are literally being forced to find other methods of disposing of their spent liquor.

One of the most interesting of recently developed waste-treatment techniques is the Zimmermann wet air combustion process (see **CHEMICAL PROCESSING**, June 1957, p. 78). The biggest commercial plant of its kind is now undergoing shakedown tests at Borregaard Paper Company's 500-ton/day pulp mill in Sarpsborg, Norway.

Developed in the U. S., the process is a continuous one, which under high pressure and temperature oxidizes organic matter with air while both are mixed with water. Combustion takes place without flame. Products are steam, nitrogen,  $\text{CO}_2$  and ash. Effluent gases contain no fly ash and are virtually odorless . . . essentially eliminating the threat of air pollution.

**Consumes 650 gpm  
Calcium-base liquor**

At Borregaard, all waste sulfite liquors, after first having been fermented and dis-

tilled to make alcohol (a common practice in European paper mills), are burned and turned into steam by the wet air-oxidation route.

Steam production, from 650 gpm of calcium-base liquor containing about 11% solids, amounts to approximately 220,000 lb per hr. This fills more than 50% of the paper mill's needs and results in the saving of 16 million gallons of fuel oil per year.

An added bonus is gypsum — production of this hitting 40,000 tons per year. The gypsum is converted to calcium carbonate and ammonium sulfate. The latter can be sold as fertilizer while the calcium carbonate may be re-used in the plant.

## Use Dual Reactors

Combustion takes place in two reactors, each measuring  $6\frac{1}{2}$  ft across and 65 ft high. One of the reactors is an A. O. Smith stainless-lined unit. The other is a forged unit of German manufacture. Reactors operate in parallel at temperatures reaching 570°F. A battery of compressors supplies 45,000 cfm of air to the reactors at 2150 psi.

Liquor enters the bottom of the reactors after having been heated to 300°F by a combination of heat exchangers and steam injection. Calcium carbonate slurry is added to the liquor to neutralize the  $\text{H}_2\text{SO}_4$ , which is formed during combustion. Prior to its entry into

the reactors, air is heated and saturated with water vapor by countercurrent contact with the hot gypsum slurry leaving the units.

The heat of combustion inside the reactors evaporates most of the water. Remaining moisture is removed from the bottom of the units with the gypsum (ash).

Steam and other gaseous products are drawn off at the top. These are then passed to a series of reboilers where the heat content is transferred to feed water, producing steam at pressure levels of 650, 400, 170, 120, 45 and 15 psi.

The noncondensable gases normally contain a certain amount of acetic acid, methanol and other organic compounds. These are removed by means of a specially-designed scrubber located in the top of each reactor.

Water condensing from the cooled gases is used as feed water on the steam side of reboilers. The condensate is first stripped of  $\text{CO}_2$  and then neutralized with NaOH.

## Five Compressors Needed

Because of the large volume of air used in the reactors, five rotary compressors are required. Four are radial-flow compressors. The other is an axial-flow unit.

The compressors are driven by four turbines. Two are expansion units that utilize the energy in the non-condens-

# STEPHENS-ADAMSON



## Revolutionary "SOLID STROKE" variable rate Vibrating Feeder!

- **POSITIVE STROKE** — The only vibrating feeder offering a solid drive connection to insure full amplitude of any stroke setting. No dampening under varying headloads.
- **AUTOMATIC STROKE CONTROL** — Offers variable conveying speed from 0 to 90 F.P.M. Easily increase or decrease tonnage handled.
- **EFFICIENT POWER FACTOR** — Standard AC electric motors, operating at peak efficiencies result in high power factor and reduced operating costs.
- **VARIABLE FEED RANGE** — The revolutionary new variable eccentric drive provides variable rate feed, first of its kind ever offered. Manual or electrical remote controls available.
- **ANGLE OF FEED** — Breaking the barrier of solid drives and variable eccentrics, the high amplitude stroke now allows for feeding in a wide range of slopes, even up hill.
- **NATURAL FREQUENCY** — The only vibrating feeder taking full advantage of the well known principle of natural frequency over its full operating range.
- **BALANCED VIBRATION** — Patented balanced design makes use of reclaimed energies of the balanced weight, energies of a vibrating feeder never before available to do useful work.
- **LOW STRESS DESIGN** — Large, heavy duty, low stress coil springs distributed along the full length of the feeder storing and releasing energy, decentralizes stress points resulting in a minimum of fatigue and bending stress.
- **HIGH CAPACITY** — Solid drive connection insures large amplitude strokes eliminating dampening and providing 50 to 100% greater capacities per given size feeder than has heretofore been attained.



**ENGINEERING DIVISION**  
**STEPHENS-ADAMSON MFG. CO.**  
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 BELLEVILLE, ONT. • MEXICO CITY, D. F.

Check 2116 opposite last page.

### CHEMICAL BUSINESS

able gases after they have passed through the reboilers. Two back-pressure steam turbines are also used.

Both the steam and gases are heated in an oil-fired superheater before being sent into the turbines. The compressors require 25,500 hp to operate. Of this, 15,500 is supplied by the expansion turbines and 10,000 by the steam turbines.

#### Future Looks Rosy

Although the installation at Borregaard has been operating for only a relatively short time, engineers are optimistic about its capabilities. The efficiency of the process already seems to exceed expectations, says Borregaard.

The wet-oxidation process can also be used to dispose of other industrial wastes. Rapidly gaining in popularity are plants for treating municipal sewage. Tests have proved that such units can sharply reduce processing costs, with considerable savings to the already overburdened taxpayer.

#### Other Plants

A giant, 200-ton/day sludge burning plant is currently undergoing trial runs at the Southwest treatment works of the Metropolitan Sanitary District in Chicago, Ill. Some smaller plants are already in operation in less-populated communities.

(Further information about the Zimmermann process may be obtained from Zimpro Division of Sterling Drug, Inc., Rothschild, Wisconsin.)

Check 2117 opposite last page.

#### NEXT MONTH

Thinking of going to spray drying? How can you tell whether it is practical for your application? Should the unit be outdoors or indoors? These and many other important points will be discussed next month in the article, "Things to consider when turning to spray drying." Don't miss it!

# A chemical company should ~~not~~ enter the consumer field

**ITEM:** In 1957 Henry H. Reichhold told CHEMICAL PROCESSING readers that a chemical company definitely should not enter the consumer-products field.

**ITEM:** In 1961 Reichhold Chemicals entered the consumer field by purchasing Alsynite, a manufacturer of translucent reinforced-plastic panels.

**QUESTION:** Is Reichhold's policy turnabout fair play for their customers?

**ANSWER:** Yes, and here's why . . .

**By HENRY H. REICHHOLD**

President and General Manager  
Reichhold Chemicals, Inc.



*As indicated by his title of president and general manager, Henry H. Reichhold is a chemical-company president who is also a technical operating manager.*

*Along with his other activities, he definitely follows the technical details of his company. He is known to appear unexpectedly at a plant manager's side in the field and ask questions about the yield and other operating details.*

*Perhaps the reason Henry Reichhold is an operating-manager president is that he manufactured his own products himself when he first started making fast-drying finishes from synthetic resins in a garage in Detroit. The operation of his company's plants is still his first interest*

WITH the acquisition of plastic-panel-maker Alsynite, Reichhold Chemicals has entered the consumer field . . . thus turning its back on a non-consumer-products policy dating back to the company's inception in 1927.

As recently as 1957, in an article in this very magazine\*, I presented several arguments to show why a chemical company should not enter the consumer field. The two main reasons were:

- 1) In entering the consumer field, a chemical company would be competing with its own customers — not a healthy situation.
- 2) Most basic-chemical com-

panies are neither set up nor staffed to handle the entirely different set of marketing, sales and distribution problems encountered in the consumer field.

Why then did Reichhold make such a move? Among the first people to pose this question to us were the editors of CHEMICAL PROCESSING magazine. They asked me if I would like to explain to readers our apparent reversal in thinking.

Now, obviously, we have revised our former policy in that we have entered the consumer field with the Alsynite acquisition. However, in this particular case, neither of our two previously stated basic objections for maintaining a non-consumer-products policy was completely valid.

Before delving into these arguments, let's take a look at the background on this move and see how it fits into our over-all plans.

## What's Behind The Change?

Alsynite is the manufacturer of translucent reinforced-plastic panels for use by the building and construction industries, as well as by the home "do-it-yourself" market. Their purchase by us is part of a program of forward integration which will strengthen our company.

Two subsidiaries and four divisions have been acquired in the last few years. The division newcomers, in addition to Alsynite, are the Alkydol Lab-

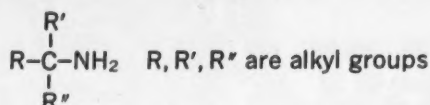
oratories, Specialty Chemicals and Varcum Chemicals Divisions. Subsidiary additions include Deecy Products, Inc. and Modiglass Fibers, Inc.

The acquisition of Modiglass — an organization manufacturing glass fibers and glass-fiber mats for the reinforced-plastic and other industries — permits RCI to wed its polyester resins with glass fibers to make reinforced plastics. Alsynite provides an excellent market for glass fibers, polyester resins and reinforced plastics.

So far so good, but still the inevitable question arises: "Aren't you now competing with some of your customers?" Yes, of course we are . . . and we realize that this was one of the two big reasons behind our

\*See "A chemical company should not enter the consumer field," Nov. 1957 CP, p. 30.

# PRIMENE 81-R...



**Low viscosity, low cost, unusual reactivity make this high-molecular-weight amine valuable for many uses**

Here are some reasons why PRIMENE® 81-R, a high-molecular-weight, t-alkyl amine, should prove interesting to you:

## Low Viscosity

In the graph below, note that the highly-branched structure of PRIMENE 81-R provides fluidity at low temperatures, while a straight-chain amine of corresponding molecular weight solidifies at 75°F.

## Low Price

Tankcar price of PRIMENE 81-R is \$0.28 per pound, f.o.b. Houston, Texas.

## Excellent Solubility in Petroleum Hydrocarbons

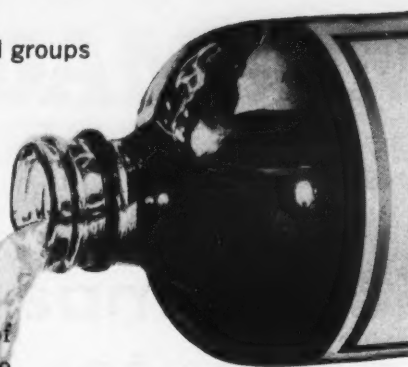
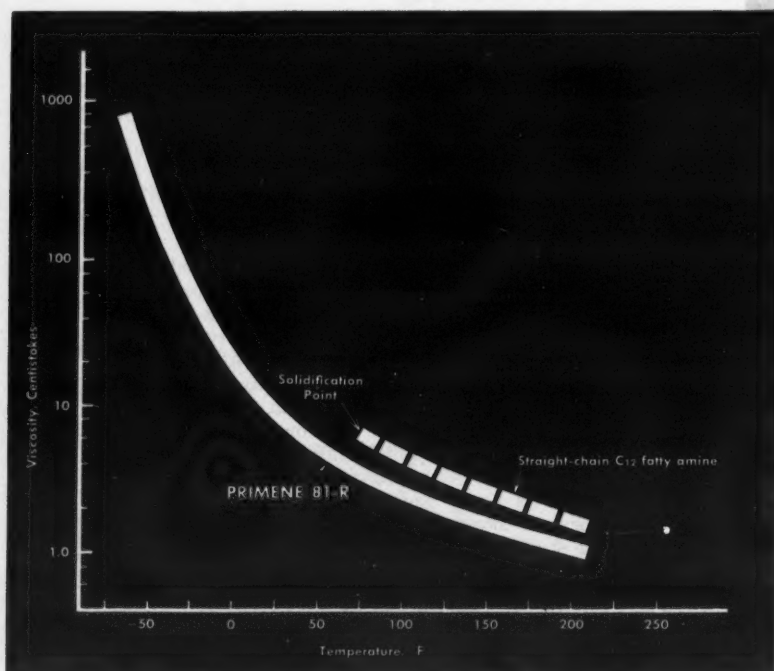
Solutions are clear even at high concentrations of PRIMENE 81-R.

## Color Stability

The good color stability of PRIMENE 81-R is attributed to this amine's unusual resistance to oxidation.

## Chemical Reactivity

All reactions common to primary amines apply to PRIMENE 81-R. In addition, the bulky t-alkyl group often makes steric control possible. Typical syntheses are: (1) hydroxyalkylation to yield aminoalcohols, (2) cyanoethylation followed by reductive hydrogenation to give diamines, (3) reaction with formaldehyde to give stable aldimines (straight-chain amines give unstable aldimines).



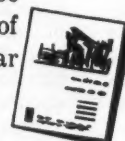
## Possible Uses

Application possibilities include: anti-dusting and anti-caking agent for hygroscopic products; stabilizer and sludge inhibitor in fuel oil; flotation agent; mold-release agent for rubber; intermediate for making surfactants, corrosion inhibitors, pharmaceuticals, rubber chemicals, insecticides, bactericides, dyes, antistatic agents, textile chemicals, latent catalysts for epoxy resins, oil-soluble salts of insoluble acidic materials.

## Other Rohm & Haas t-Alkyl Amines

Rohm & Haas' line of t-alkyl primary amines includes: PRIMENE 81-R (12-14 carbons), PRIMENE JM-T (18-22 carbons), t-Butylamine, t-Octylamine, Mentane diamine.

Write for a copy of this 44-page book listing applications and reactions of t-alkyl amines. We will also be glad to send samples of amines that appear promising to you.



**ROHM & HAAS**

PHILADELPHIA 5, PA.



## CHEMICAL BUSINESS

former "hands-off" policy on consumer products.

However, only a few companies (about half a dozen) are engaged in the manufacture of plastic panels. Alsynite was the only one of these that had been, or is now, obtaining substantial quantities of resins from us.

As a matter of fact, all of these panel manufacturers were glad to have Reichhold enter the field as they knew the entry would mean a big promotion and sales push for plastic panels that would benefit all companies in the industry. Also, the move promised development of new types of panels and new applications that would result in more business for everyone.

How about our other resins customers? Prior to making the decision to acquire Alsynite, we checked with our hundreds of non-panel-making customers in the reinforced-plastics industry and found they welcomed our entry. The reason: They felt they stood to gain a good deal from our first-hand knowledge obtained from research on new applications of RCI resins and materials made by our subsidiary, Modiglass.

Alsynite's position as a leader in the field serves to give impetus to greater sales and uses of reinforced plastics — benefiting the entire industry. Alsynite's research facilities complement those of Reichhold laboratories and serve to provide vital information and new developments that, up until now, were not available from a single source.

## Move Doesn't Hamper Reichhold Organization

As for our not being set up to handle the unique organizational and manpower problems connected with consumer products — the second basic reason for our not wishing to enter the consumer field — this drawback was not applicable in this particular case.

Since Alsynite was operating completely on its own when acquired, the regular industrial activities of Reich-

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Check 2118 opposite last page.



# Free-radical source reacts at low temperatures

**Isopropyl percarbonate produces polymers  
of increased linearity, good color  
and weather stability**

ISOPROPYL PERCARBONATE (IPP), also known as diisopropyl peroxydicarbonate, is useful as a catalytic source of free radicals at relatively low temperatures. In polymerization reactions it provides higher conversion and such economies as reduced catalyst cost and more uniform processing conditions. The material can be used to advantage in most polymerization processes where peroxy compounds are useful in initiating the reaction.

IPP has been used successfully in the polymerization of ethylene, styrene, vinyl acetate and other vinyl esters including vinyl chloride and vinylidene chloride. In addition, it has been used in making polymers from methyl methacrylate and acrylic esters; allyl diglycol carbonate; diallyl phthalate and other allyl esters. Polymerization of polyester mixtures based on unsaturated alkyds and styrene or allyl monomers and many other monomers, where polymerization is catalyzed by peroxy compounds, can also be performed.

Because of lower reaction temperatures, polymers of increased linearity are formed which are characterized by improved physical properties. Good color and stability to weathering are achieved due to lessened residual contamination with undesirable catalyst fragments.

High degree of reactivity of IPP as a catalyst results in smaller quantities being required than with conventional catalysts. This is an important economic advantage where similar reaction rates must be maintained because of equipment design or process requirements. In some cases, increased quantities may speed up sluggish reactions.

Furthermore, this high degree of activity permits the compound to be used in continuous polymerization systems, as well as batch processes.

Generally, the amount of IPP required is about the same as in the case of benzoyl peroxide, although in some polymerizations less is required. In practice, polymerization with this catalyst may be carried out about 25°C lower than when a corresponding amount of benzoyl peroxide is used.

## Active Oxygen 7.8%

IPP has 7.8% of active oxygen as compared with 6.6% for benzoyl peroxide. It liberates iodine from acidified solutions of potassium iodide; this property is used as the basis of an analytical method for determining the assay of solutions.

The material decomposes on contact with concentrated sulfuric acid. In contact with

To page 37

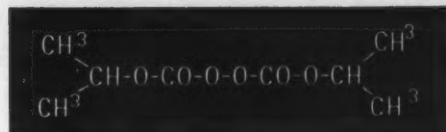


TABLE 1

Molecular weight (C <sub>9</sub> H <sub>14</sub> O <sub>5</sub> )	206.18
Melting point	8-10°C (46-50°F)
Refractive index n <sub>D</sub> 20°C	1.4034
Specific gravity 15.5°/4°C	1.080
Solubility in water at 25° C, g/100g H <sub>2</sub> O	0.02
Solubility in organic solvents	Miscible with aliphatic and aromatic hydrocarbon esters, ethers, chlorinated hydrocarbons

TABLE 2

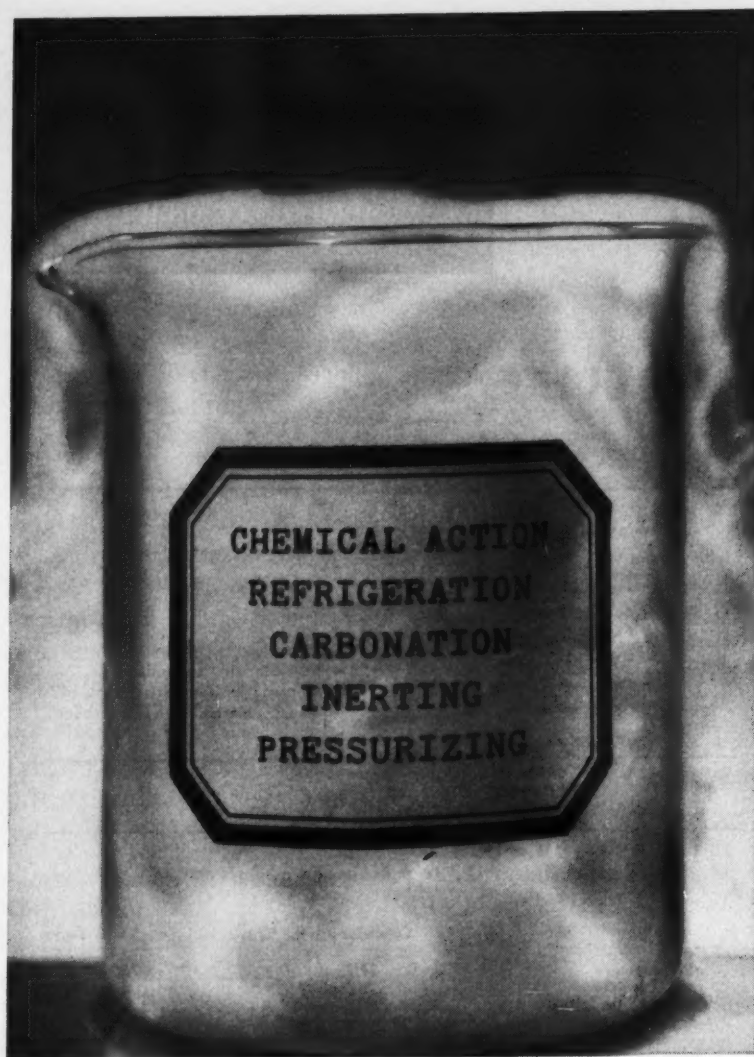
## Half-life of IPP in a Number of Solvents

Solvent	Original Concentration, %	Half-life at 25°C, Days
Diethyl maleate	27.7	12.5
Tricresyl phosphate	27.6	10.1
Tetralin	29.4	4.9
Perchloroethylene	30.6	4.5
Dibutyl phthalate	28.8	4.0
Isopropyl alcohol	25.0	dec. 25 min.
V. and P.M. naphtha	5.0	3.9
Sohio aliphatic solvent	5.0	8.7
Xylene	5.0	14.6
Phillips Soltrol No. 130	15.0	12.4

TABLE 3

## Temperature Effect on the Half-life of IPP

Solvent	Original Concentration, %	Temperature °C	Half-life Days
Phillips Soltrol No. 130	15.0	25	12.4
Phillips Soltrol No. 130	15.0	38	0.6
Xylene	5.0	25	14.6
Toluene	3.0	50	0.25
Allyl diglycol carbonate	3.3	45	0.45
Allyl diglycol carbonate	3.3	50	0.33
Allyl diglycol carbonate	3.3	60	0.067



## Unlimited versatility MATHIESON CO<sub>2</sub>

From the chemistry lab to the shipping platform, Mathieson CO<sub>2</sub> performs numerous vital jobs economically and efficiently. As a liquid or solid, this Jack-of-all-trades is immediately available in any quantity from your nearby Olin Mathieson warehouse. If you'd like more information on the economical use of CO<sub>2</sub>... write Olin Mathieson, Baltimore 3, Maryland. A free, informative booklet will be sent to you posthaste.

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CHEMICALS DIVISION **Olin**

Check 2119 opposite last page.

## CHEMICAL MATERIALS

### Four impact grades of polypropylene are announced

Injection and blow molding are main market targets for four impact grade polypropylene polymers recently announced. All four grades retain electrical, chemical and high heat resistance properties of general purpose polypropylene with each offering greater impact strength at room temperature.

Impact strength is retained at lowest temperature, -10°C, by resin Grade 3210. Resin color, a translucent white, is reported to be superior to currently available impact polypropylenes.

Impact Grade 3116 is recommended for injection molding applications. High impact Grade 3216 is also for injection molding. High impact Grade 3211 is a sheet grade polymer, and high impact Grade 3210 is suggested for blow molding.

(Impact Grade polypropylene is a product of AviSun Corp., Polymer Sales Dept., 1345 Chestnut St., Philadelphia 7.)

Check 2120 opposite last page.

### Metal-filled silicones show properties of rubber and metal

**Uses:** Plastic products can be used at very low and very high temperatures. This can fulfill many design requirements in electronics, chemical and nuclear fields.

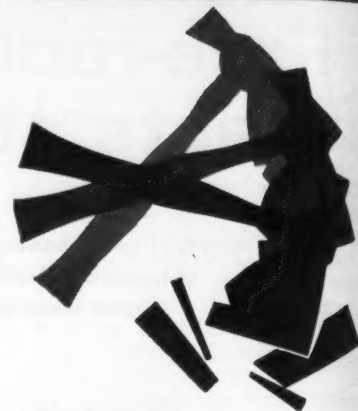
**Features:** Basically rubber-like in character, compounds metal fillers impart unusual characteristics to the final product.

**Description:** Metal-filled silicone resins, identified as Epocast H-1759 systems, are available with a variety of fillings. These include bronze, steel, copper and aluminum. Materials retain the rubber characteristics of the silicone resin structure.

(Epocast H-1759 systems are a product of Furane Plastics Incorporated, 4516 Brazil St., Los Angeles 39, Calif.)

Check 2121 opposite last page.

## Dow Corning SILICONE DEFOAMERS



## CHOP OPERATION COSTS

**Most effective.** Dow Corning silicone defoamers are best for banishing space-filling, time-eating foam in the processing of any foamer... from asphalt to beans to peas to zeins. Dow Corning Silicones start quicker, last longer. Eliminate messy and unsanitary foam-overs. Turn maintenance into production time.

**Most efficient.** Even the most violent foamers are tranquilized with a tiny amount of a Dow Corning silicone defoamer — often one part silicone solids per 10 million parts foamer is effective. For true economy, change to a Dow Corning antifoamer or defoamer. There's one just right for your product and system — oil, aqueous or food.

## FREE SAMPLE

Send today for a generous trial sample and full data. Please specify type of system. Address Dow Corning Corporation, Midland, Michigan, Dept. 2724.



**Dow Corning**

Check 2122 opposite last page.

CHEMICAL PROCESSING

## Free-radical source reads at low temperature From page 35

amines or aqueous potassium hydroxide the decomposition is accelerated.

The compound deflagrates on contact with flame, although ignition is somewhat slower than with some other widely used peroxy compounds. Tests have demonstrated that, under conditions met in storage, transportation or application, the material does not undergo explosive decomposition.

It decomposes spontaneously at room temperature, with rapid formation of gases of decomposition. Thus, storage in a closed container should be avoided. Because of this property, IPP is usually stored and handled in the frozen state as a colorless crystalline solid. Other properties are shown in Table 1.

### Stability in Solution Is Big Factor

Isopropyl percarbonate is usually used in solution, either in a monomer or an inert solvent. Stability of the catalyst in solution is thus of importance. Ease of producing free radicals for use in polymerization is also related to the rate of decomposition in the medium being used.

Rate of decomposition of an organic peroxide at a specified temperature is in terms of its half-life. This is the time required for one-half of the peroxide originally present to decompose. Data on the half-life of IPP in a variety of solvents are given in Table 2.

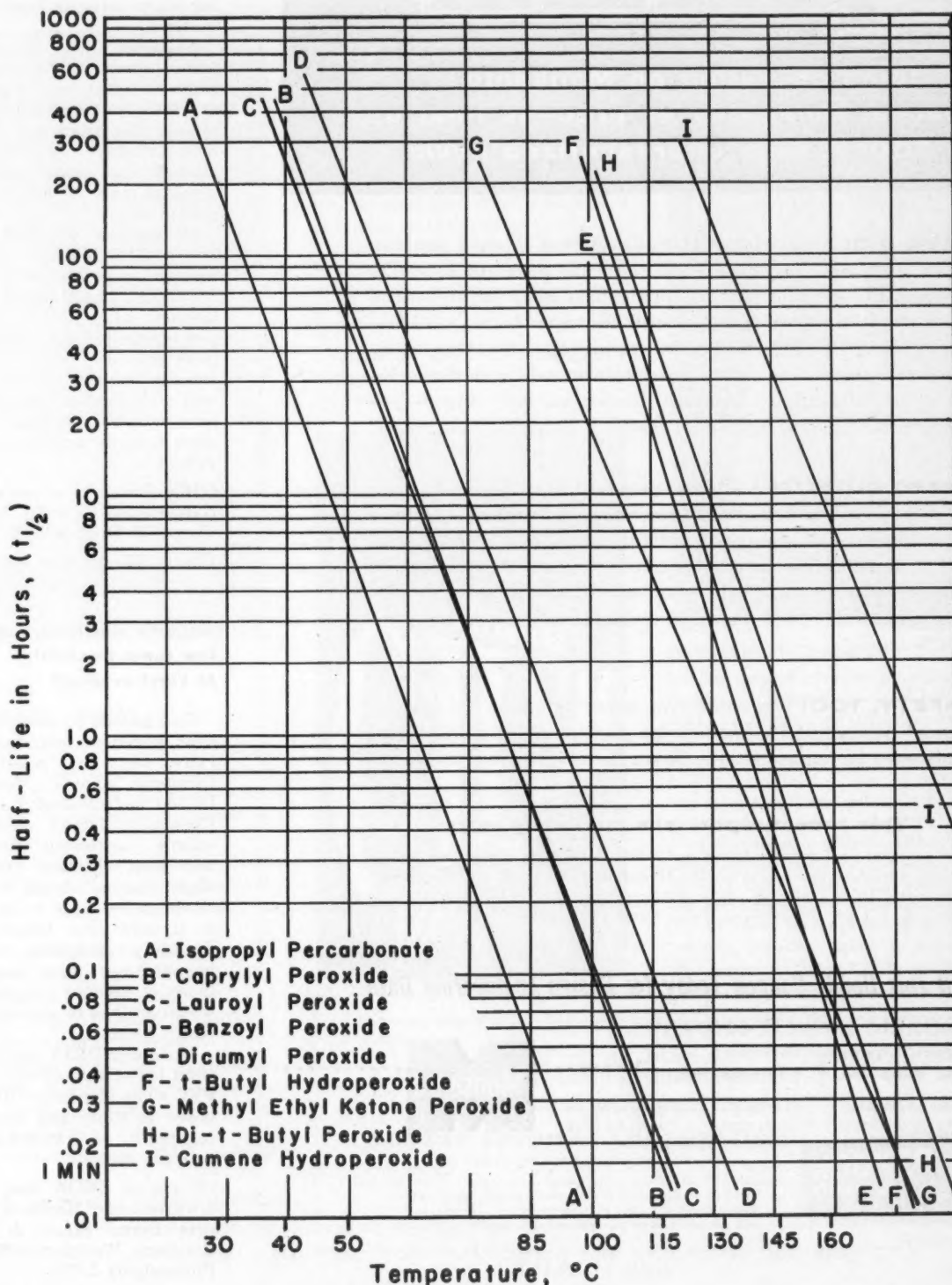
Effect of temperature on the half-life of IPP in several solvents is outlined in Table 3.

The half-life of the compound in benzene at different temperatures is compared with published data on other peroxides in Fig 1.

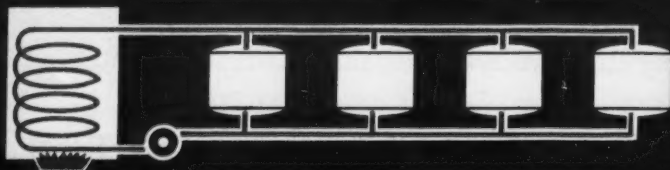
(Isopropyl Percarbonate is product of Market Development Department, Chemical Division, Pittsburgh Plate Glass Company, One Gateway Center, Pittsburgh 22, Pa.)

Check 2123 opposite last page.

FIGURE 1



# FOR + MAXIMUM EFFICIENCY



**Systems operating on Monsanto Thermal Fluids deliver process heat up to 600° F. from unpressurized liquid.**

**SAVE BIG!** Now, with Monsanto Thermal Fluids, you can install a process heating system that will generate up to 20 million BTU per hour and deliver the heat as an unpressurized liquid to multiple use points! Needs no vapor traps, gas blankets, pressure piping, vaporizers, condensers, or other fancy "gadgets." Needs no costly, space-filling safety devices. No water conditioning; no pressure danger; no fire danger—you do not need a licensed engineer to operate a Thermal Fluid system!

**SPEED OUTPUT!** With heat delivered via a liquid Thermal Fluid, you cut maintenance to the bone (no corrosion, no fouling of tubes, pipes, pumps, or coils); heat evenly (no hot spots); control temperature on-the-button (to within 2° F.). Result: better quality resins, foods, pharmaceuticals, dyes, hydrocarbons, chemicals—plus increased production (in some cases up to 50% more)!

**SAFETY, TOO!** You can forget worrying about fire and explosion! Monsanto Thermal Fluids won't support combustion. Can't even be ignited by the direct flame of a blowtorch!

## This recent report tells the safety story:

"My operator fired the gas heater but failed to start the circulation pump. The coil overheated and ruptured. The Monsanto fluid poured into the firebox. There was a lot of smoke, of course, but no external fire. And as soon as the heater was cut off, the smoking stopped immediately!"

## Mail This Handy Coupon Today for Design Engineering Data

### MONSANTO CHEMICAL COMPANY

Organic Chemicals Division  
Dept. 4468-GG, St. Louis 66, Mo.

Please send me: ( ) Technical Bulletin 1248 on Monsanto Thermal Fluids; and ( ) list of heating system designers and heater manufacturers.



NAME.....  
COMPANY.....  
STREET.....  
CITY..... ZONE..... STATE.....

Check 2124 opposite last page.

## CHEMICAL MATERIALS

### Chemically toughened warp-size starch ups efficiency

**Uses:** Starch is recommended for warp sizing in textile operations.

**Features:** Chemical modification produces a tougher starch film with greater strength. Instron tests have shown that films are up to 30% stronger. High film strength has made efficient weaving practical with a lower size pickup.

**Description:** Modified corn starch, HFS Starch, is a white material in unground or pearl form. This starch comes to its ultimate viscosity without passing through the usual high peak viscosity often troublesome in weaving operations. It will resist viscosity breakdown on continued cooking. Constant viscosity assures uniform pickup.

(HFS Starch is a product of National Starch and Chemical Corp., 750 Third Ave., N.Y. 17.)

Check 2125 opposite last page.

### Adipate plasticizers offer low temp flexibility to vinyl products

Two adipate plasticizers have been added to manufacturers line of vinyl plasticizers. Diisooctyl adipate (Monoplex DIOA) and diisodecyl adipate (Monoplex DDA) offer excellent processing qualities and good chemical stability. Major feature offered to vinyl products by these compounds is superior low temperature flexibility. According to the manufacturer, these two plasticizers produce dispersions which are low in viscosity and easily handled.

Monoplex DIOA has somewhat better compatibility with PVC while Monoplex DDA has lower volatility and improved resistance to extraction by aqueous media.

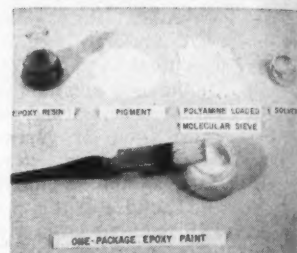
(Monoplex DIOA and DDA are products of Resinous Products Dept., Rohm & Haas Company, Washington Square, Philadelphia 5, Pa.)

Check 2126 opposite last page.

### 'One-can' epoxy systems made possible using molecular sieves

**Paint and adhesives cure by atmospheric moisture**

**Uses:** System is designed for the latent hardening of epoxy resin (bisphenol A-epichlorohydrin) formulations. End uses for such formulations in-



Epoxy paint is ready to use, as received, in a single can, when chemical-loaded molecular sieves are used in formulating

clude coatings, adhesives and potting compounds.

**Features:** It is now possible to prepare stable, "one-can" epoxy formulations that cure at room temperature. These one-can systems are reported to exhibit excellent shelf life, lower exotherms during cure, and cure rates approaching that of conventional systems. Ordinarily toxic polyamines can be handled safely.

Manufacturing costs can be reduced because production and packaging are simplified. For the user, on-the-job mixing is eliminated, limited pot life ended and poor curing due to inaccuracies in mixing are no longer a problem.

**Description:** System is made possible by absorbing catalyst within the pore structure of molecular sieves. Catalyst is completely isolated from epoxy resin. When applied as a thin film, as in a coating or adhesive, atmospheric or substrate moisture displaces the catalyst and the system cures. Heat can also be used to activate the catalyst in conjunction with moisture. Or, with special modification, system can be entirely heat cured.

Choice of sieve-catalyst

combination (chemical-loaded molecular sieve) will depend upon cure conditions required, or available, for a specific application. Three basic types are now available for epoxy formulations: simple poly-amine-loaded; modified poly-amine loaded; and tertiary amine loaded. A simple poly-amine-loaded system will provide a one-year shelf life and cure at room temperature in eight hours using atmospheric moisture as a displacing agent.

Molecular sieves are synthetically produced crystals of metal aluminosilicates. When heated, these water-bearing minerals give off their water without disintegrating and can readsorb it or other chemical when they are cooled.

Structure of sieves is a precisely arrayed network of cavities interconnected by apertures of uniform size. Network comprises almost 50% of total volume of the crystals. Molecules are adsorbed within the cavities and are thus isolated from surrounding materials.

(Chemical-loaded molecular sieves are a product of Linde Company, Division of Union Carbide Corporation, 270 Park Ave., New York 17, N.Y.)

Check 2127 opposite last page.



#### DID YOU KNOW WE MAKE THESE?

Among many chlorinated organics we make are these two chemicals often used in syntheses to introduce the caprylyl or butyryl groups respectively.

Take caprylyl chloride, for example. It reacts with water and alcohol, is miscible with most other common solvents.

Our product has a freezing point of below minus 70°C. and typically contains 21.8% chlorine.

It is reportedly used in emulsifying agents and lubricants.

Then there is our butyryl chloride. A clear, colorless liquid, it reacts with water and alcohol and is infinitely soluble in ether.

It freezes at minus 89°C., boils at 102°C.

Data sheets give you more of the story. Just check and mail us the coupon.



## BRIEFS

caprylyl chloride  
butyryl chloride  
lauryl mercaptan  
lauryl pyridinium chloride

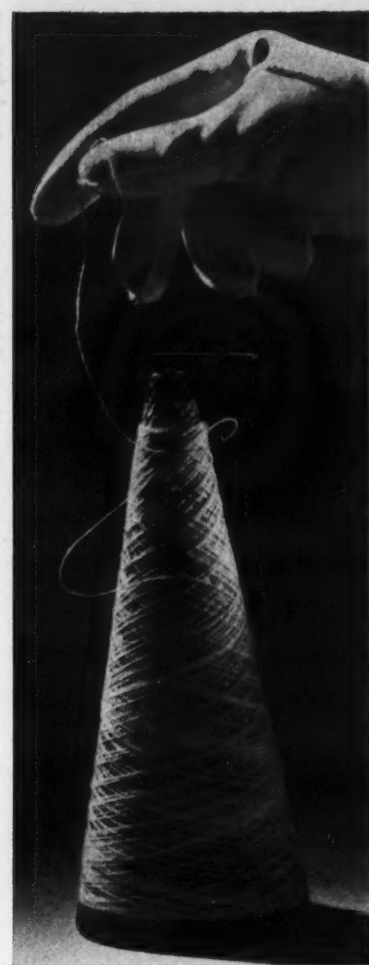
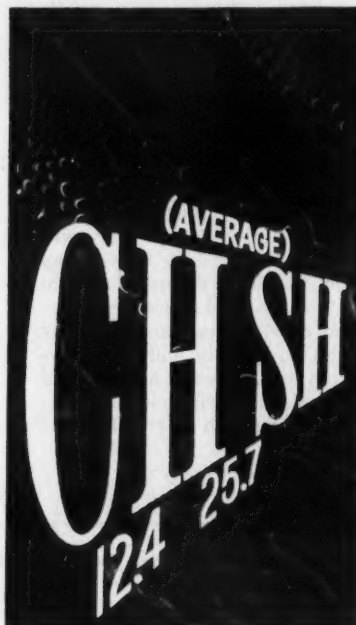
#### NEED TO MODIFY A POLYMERIZATION?

Our lauryl mercaptan may be just the answer you are seeking.

A clear, water-white liquid with a characteristic mild odor, it contains no less than 14.6% mercaptan sulfur, no more than 0.5% chlorine. It is soluble in benzene up to 99.75%.

It more than meets U. S. Rubber Reserve Spec LM 2.5.0-5—and is used in the synthetic-rubber "hot" process as well as other polymerizations.

Our data sheet covers specifications and typical data. It's yours for the asking.



#### CATIONIC DETERGENT

Hooker lauryl pyridinium chloride, having a minimum assay of 85%, is sold as an unrefined technical material. Like most quaternary ammonium compounds, it has potent bactericidal properties. But its primary use is as a cationic agent in viscose rayon production, to prevent clogging of spinneret orifices. Other possible applications: dispersing and wetting agent, stripping agent for vat and other dyes, intermediate in manufacture of foam-resistant compounds, leveling agent in polishes and waxes. Write for data sheet.

For more information, check here and mail with name, title, and company address.

☐ Caprylyl chloride    ☐ Butyryl chloride    ☐ Lauryl mercaptan  
☐ Lauryl pyridinium chloride

For the complete line of Hooker chemicals, see Chemical Materials Catalog or Chemical Week Buyers' Guide.

#### HOOKEER CHEMICAL CORPORATION

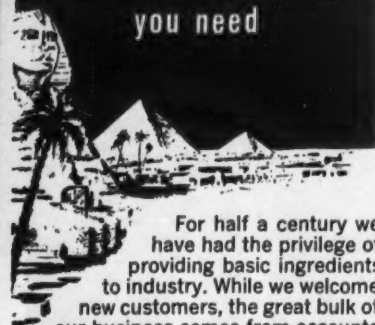
512 Forty-seventh Street, Niagara Falls, New York

Sales Offices: Buffalo, Chicago, Detroit, Los Angeles, New York, Niagara Falls, Philadelphia, Tacoma, Worcester, Mass.  
In Canada: Hooker Chemicals Limited, North Vancouver, B. C.

**HOOKEER**  
CHEMICALS  
PLASTICS

Check 2128 opposite last page.

Time and **Tamms**  
produce the products  
you need



For half a century we have had the privilege of providing basic ingredients to industry. While we welcome new customers, the great bulk of our business comes from accounts who have been on our books as long as two generations. Tight quality control is a tradition with Tamms, and this policy insures uniformity of product, a safeguard for the quality of your products or processes. We will be delighted to send samples, specifications, and prices.

#### SILICAS

Amorphous, Diatomaceous and Crystalline

#### TAMART

Produced and graded special for Metal Finishing Industry

#### RED OXIDES

Natural and Synthetic grades

#### MINERAL BLACK

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#### CALCIUM CARBONATES

Dry Ground and Water Ground

#### MAGNESIUM CARBONATE

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3-in-1 Extender Pigment available in 5 different mesh sizes

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An Oil-Grease and Water Floor Absorbent, Natural and Calcined Grades

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#### PUMICE STONE

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**INDUSTRIES CO.**

228 North La Salle Street • Chicago 1, Illinois  
Dept. CP-121

**TIME TESTED PRODUCTS  
FOR INDUSTRY**

Check 2129 opposite last page.

## CHEMICAL MATERIALS

# Acrylic copolymers form polish films that resist detergents and alkalis

Coatings can be quickly and easily  
removed with mild acid cleaners

**Uses:** Polymer emulsions were developed for, and should find most initial use in, floor polishes. They contain functionally active groups that can interact with carboxyls, acid chlorides, acid anhydrides, epoxies, aldehydes, lactones and sulfhydryls, such as found in natural and synthetic fibers, coatings and films.

Additional potential uses, based on this activity, would include photographic chemicals, coatings for paper, adhesives, textiles and leathers.

**Features:** Properly formulated polishes or other coatings will be inherently water- and alkali-resistant. They will not be affected by water, soap or alkaline detergents even after repeated exposure. However, when necessary, coating can be quickly and completely removed with a mild acid (lactic or citric) cleaner.

Floor-polish formulations

tested have shown improved performance properties when compared to commercially available polishes. Substantial improvement was noted in wearability, recoatability and maintenance.

#### Emulsions Are Acid Soluble

**Description:** Acrylic copolymer emulsions are offered as acid-soluble (NeoCryl A-400) and acid-dispersible (NeoCryl A-410) products. Coatings based on the acid-soluble polymer can be removed with only mild-acid and wetting-agent-solutions. For the acid-dispersible resin, combinations of mild acid, wetting agent and water-miscible solvent are required.

Both resins are similar in appearance (light-tan translucent emulsions) and in general physical properties. Both

To page 42

#### General Floor Polish Formulations\*

Blend Number	1	2	3	4	5	6	7
NeoCryls A-400 or 410	85	85	85	80	65	65	55
Wax emulsion	15	10	5	10	25	35	35
Alkali-soluble resin solution	—	5	10	10	10	—	10
Tributoxyethyl phosphate	2	2	2	2	2	2	2
Fluorocarbon	1	1	1	1	1	1	1
(FC 134 — 1% solution)							

All ingredients are prepared at 15% solids except coalescents. Wax emulsions can be prepared by conventional wax-to-water methods. Final pH should be adjusted to about 9.5.

\*First four formulations provide very hard, durable finishes having excellent gloss and leveling. One and two exhibit better water and alkali resistance and recoatability. Three and four are slightly better with respect to gloss and leveling. Five is slightly buffable and six and seven are moderately buffable. Partial use of hard waxes is recommended with these buffable formulations.

# POTENTIALLY LOW COST POLYMER RAW MATERIALS

## METHYL CARBAMATE\* LIQUITHANE\*

(Eutectic Mixture of  
Methyl and Ethyl  
Carbamates)

## N-METHYLOL METHYL CARBAMATE METHYLENE BIS METHYL CARBAMATE

all available from  
**BERKELEY CHEMICAL  
CORPORATION**  
Berkeley Heights, New Jersey

inquire  
our sales agents

**Millmaster**  
Chemical Corporation

88 PARK AVENUE  
NEW YORK 16, NEW YORK  
MUrray Hill 7-2757

\*Patents approved

Check 2130 opposite last page.

CHEMICAL PROCESSING

## THAT'S INTERESTING

### **Pectin cuts Sr<sup>90</sup> effect**

A diet enriched with pectin extracted from sunflowers seems to offer some protection against strontium<sup>90</sup>, Soviet researchers say.

They believe pectin would act in the body to bind toxic metals, such as Sr<sup>90</sup>, and thus expedite their excretion. Tests with rats proved that pectin reduces absorption and deposition of the isotope in the skeleton, they say.

### **Herbicide beefed up**

Diuron, which has been limited in effectiveness as a herbicide to killing weeds before they emerge, now can be used against emerged weeds.

This added potency was gained by USDA researchers simply by mixing the herbicide with any one of several surfactants.

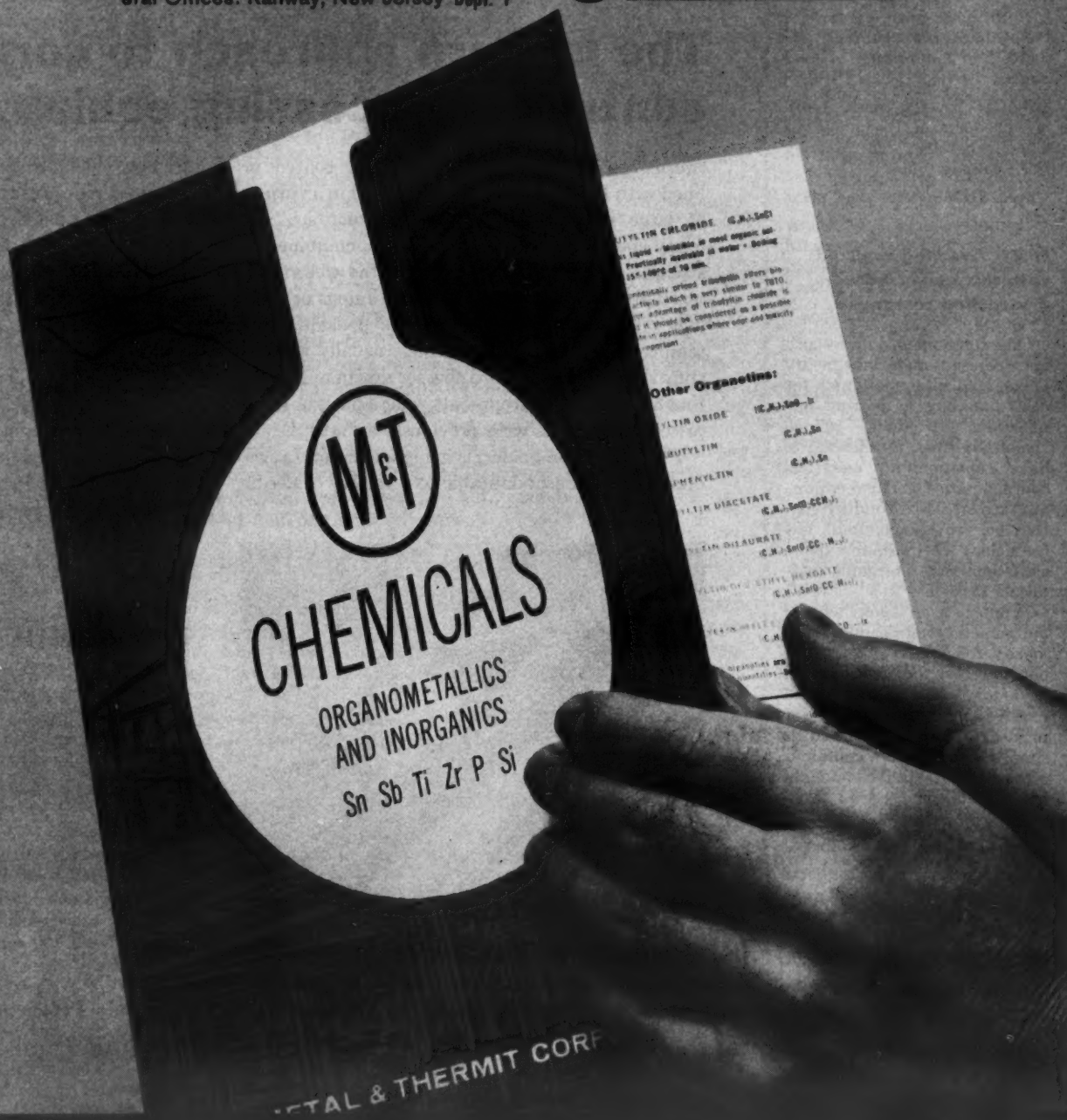
For more information on product at right, specify 2131 see information request blank opposite last page.



## You'll want this new catalog...

If you are interested in **TIN CHEMICALS** such as inorganic salts or stannates, or those salts of organic acids known as **TIN "SOAPS."** And there is more information than ever on **ORGANOTINS.** There is an expanded list of **U-FOAM CATALYSTS** plus the well known M&T line of **VINYL STABILIZERS** in a complete line of organotin and Ba-Cd types. High in current interest are M&T **FLAME RETARDENTS** for plastics and coatings. Data on **ANTIMONY CHEMICALS** and on antimony and zirconium **OPACIFIERS** and other specialty products are all in this new catalog. Get it by simply writing to **METAL & THERMIT CORPORATION**, General Offices: Rahway, New Jersey Dept. P

**M&T CHEMICALS**



VINYL CHLORIDE (C<sub>2</sub>H<sub>3</sub>Cl)  
Liquid - Insoluble in most organic sol-  
vents - Freely soluble in water - Boiling  
point 38.1°C at 760 mm.

Commercially prepared vinyl chloride offers in-  
teresting properties which are very similar to TOTO.  
The advantage of vinyl chloride is that it  
should be considered as a possible  
monomer in applications where color and toxicity  
are important.

### Other Organotins:

VINYL OXIDE (C<sub>2</sub>H<sub>3</sub>SnO) -

BUTYL TIN (C<sub>4</sub>H<sub>9</sub>Sn)

PHENYL TIN (C<sub>6</sub>H<sub>5</sub>Sn)

VINYL DIACETATE (C<sub>4</sub>H<sub>7</sub>SnO<sub>2</sub>)

VINYL DIACRYLATE (C<sub>4</sub>H<sub>5</sub>SnO<sub>2</sub>)

VINYL ETHYL KETONE (C<sub>4</sub>H<sub>7</sub>SnO)

VINYL ETHYL KETONE (C<sub>4</sub>H<sub>7</sub>SnO)

VINYL ETHYL KETONE (C<sub>4</sub>H<sub>7</sub>SnO)

VINYL ETHYL KETONE (C<sub>4</sub>H<sub>7</sub>SnO)

METAL & THERMIT CORP.

From page 40

can be formulated by conventional techniques, by blending with wax emulsions and alkali-soluble resin solutions.

#### Physical Properties

Solids, %	40 ± 1
pH	9-10
Surface tension (dynes/cm)	46
Viscosity, max (cps @ 25°C; Brookfield LVF #1 spindle, 60 rpm)	40
Particle size (microns)	0.02-0.04
Lb/gal	8.8

Both resins form a colorless, clear, hard film. Storage life at 52°C is a minimum of four weeks.

(NeoCryl A-400 and A-410 are products of Polyvinyl Chemicals, Inc., 26 Howley St., Peabody, Mass.)

Check 2132 opposite last page.

#### Easier handling realized with this epoxy-based dry-casting compound

One-component, low-cost, epoxy-based material in dry powder form is designed for easy handling in potting applications. Product, named Hysol Dri-Cast, is reported to have outstanding electrical characteristics and exceptionally high thermal conductivity. Its low shrinkage and low coefficient of thermal expansion approach inorganic materials in value.

Product is an epoxy coated inorganic crystal designed primarily for low cost and easy potting. It handles the same as a dry coarse powder and requires no preparation prior to use. Potting compound is simply poured into a container completely around component being potted and placed in an oven for cure.

(Hysol Dri-Cast is a product of Hysol Corp., Olean, N.Y.)

Check 2133 opposite last page.

For more information on developments in this section, check the Reader Service Slip.

# Penton\*Steel Constructions

## The modern approach to corrosion control in processing equipment

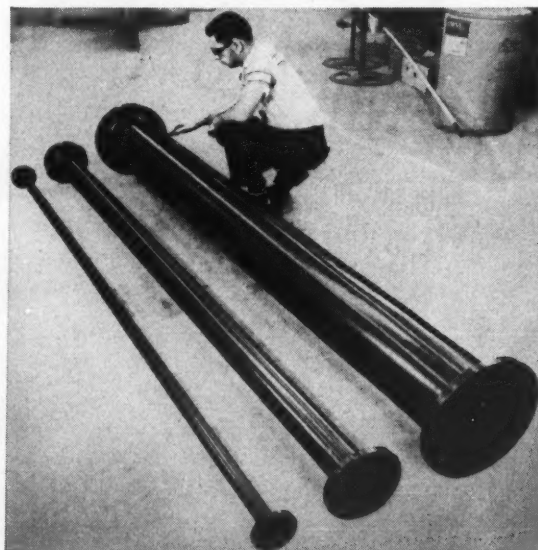
Sturdy steel processing components, coated or lined with Penton, are now widely used in a variety of large installations. "P-S Constructions," as many specifying engineers call them, combine the strength and rigidity of steel with the well-recognized protection of Penton. Penton linings or coatings on low-cost metal substrates provide high-temperature corrosion resistance, usually at substantial savings. They are now serving in numerous tough corrosive environments, where glass or high-priced metal parts were previously a "must."

P-S pipe, in particular, is in high demand. Large-diameter sections, adaptable to a variety of needs,

are now available. Both Penton-lined and Penton-clad steel pipe are often used with Penton valves—also of P-S Construction—in one or more of several types offered by leading manufacturers. Steel tanks and vessels lined with Penton are also being used more and more.

"P-S" is the word these days, as engineers take this modern approach to low-cost, long-term corrosion protection. To learn more about P-S Constructions, write for "The Penton Buyer's Guide," a complete listing of suppliers of valves, pipe and fittings, pumps, meters, tank linings and coated parts made with Penton.

\*Penton is Hercules' registered trademark for chlorinated polyether.



**LARGE-DIAMETER PENTON PIPE MAKES BIG NEWS.** These large Penton-clad pipe sections were produced by Polymer Corporation by its patented fluidized bed process. The tough, uniform pinhole-free coating, 25 to 35 mils in thickness, provides Penton's well-established protection against high-temperature corrosion inside and out. These Penton-Steel constructions by Polymer come in standard 10-ft. lengths, in diameters of 1½ to 24 in., Schedule 40 wall thickness; Penton-clad steel flanges, elbows, tees, crosses, reducers, and laterals are also available.

Large-diameter P-S pipe meets a variety of needs in chemical processing. Multiple coupled sections can serve as reactors, scrubbers and washers, distillation columns, and ducts for fume take-off. For conventional pipework, P-S pipe combines the strength of steel with economical Penton protection against corrosion.

# FOR COMPLETE PROCESSING SYSTEMS

## PENTON-STEEL CONSTRUCTIONS PROVIDE LOW-COST PROTECTION IN ROUGH ACID SERVICE

Engelhard Hanovia Inc. piping systems, internally coated with Penton, have been in service since November 1960 in a large East Coast processing plant where corrosion plays a major part in material selection. The standard 3-inch flanged pipe and fittings, internally coated, are subjected to cyclical flow of chlorides for about 4 hours daily. The Penton-Steel construction is an outdoor installation, uninsulated and exposed to ambient temperatures while fluid temperatures

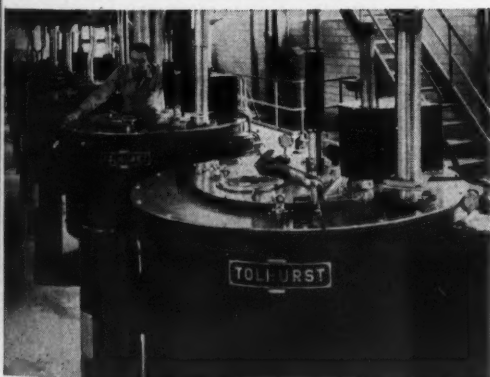
range from 120°F. to 170°F. The pipe lines have been subjected to temperature differentials up to 180°F. The Penton coating is exposed to a chloride solution of low pH and on occasion to excess hydrochloric acid.

Engelhard Hanovia achieves excellent bonds between metal and Penton with its exclusive pipe-coating process. Thicknesses in the range of 10 to 60 mils can be easily obtained by this process.



## PENTON SHEET WAS THE DOOR TO SOLVING GLIDDEN'S CORROSION PROBLEMS.

In service more than 18 months at Glidden's Baltimore, Maryland, plant, this Penton-lined condenser door has been continually exposed to hot steam condensate with traces of sulfuric and other chemical additives. During operations, hot steam is drawn into the condenser from a large processing vessel containing 20% sulfuric, water and a mixture of titanium dioxide and iron sulfate at 230°F. The condensate is returned to the vessel, where a constant level and specific gravity are maintained. Rubber Millers, Inc., Baltimore, Md., manufactured the Penton-lined door for The Glidden Company.



## FOR THE PROCESS INDUSTRIES...

**PENTON-COATED CENTRIFUGES.** Pfaudlon 301 water suspension Penton coatings proved a "natural" for Tolhurst centrifuges which play so great a part in chemical processing. Practically every interior part of the centrifuge in contact with slurry, separated solid or liquid is coated with Penton to maximize resistance to corrosion. Penton coatings achieve the excellent bond strength needed for use in centrifuges where material constructions undergo tremendous stress. Pfaudlon 301 coatings are applied by Pfaudler Permutit, Inc., Rochester, N.Y., for Tolhurst Centrifugals Division, American Machine & Metals Inc., East Moline, Ill. Wherever processing conditions require corrosion resistance at elevated temperatures, Penton-Steel constructions are the logical means of achieving low equipment costs.

Polymers Department

**HERCULES POWDER COMPANY**

Hercules Tower, 910 Market Street, Wilmington 99, Delaware



**P-S YOU'LL SAVE MONEY**

QP61-9

Check 2134 opposite last page.

## This polymeric plasticizer is priced in range of monomeric compounds

**Uses:** Product is particularly suited for use in PVC formulations for coated cloth, adhesive backed film and in high-density foamed vinyl for outer wear and upholstery.

**Features:** General purpose polymeric plasticizer provides permanent plasticizing of polyvinyl chloride. It is available in the range of the better-quality monomeric compounds, 34c per pound in bulk quantities, with freight allowed.

**Description:** An adipic acid glycol polyester, trademarked Santicizer 411, plasticizer is reported to be unique in its excellent resistance to extraction either by mineral oils or soapy water. It is a clear, viscous liquid at 30°C, with a very faint ester odor.

(Santicizer 411 is a product of Monsanto Chemical Co., Organic Chemicals Div., 800 N. Lindbergh Blvd., St. Louis 66.)

Check 2135 opposite last page.

## Oxidized potato starches form tough flexible film on paper surface

**Uses:** Starches are designed for paper coating to improve printability and reduce penetration of gloss inks.

**Features:** Typical "long" texture of potato starch imparts improved film structure desirable in surface sizing and coating operations.

**Description:** Improved line of oxidized potato starches, called Arogums, are available in several viscosities to meet the varied requirements of tub, calendar and size press operations. Starches form a tough, flexible film to improve the writing and printing surface as well as increased sheet strength and surface characteristics. One grade is particularly recommended for scuff resistance.

(Arogums are a product of Morningstar-Paisley, Inc., 630 West 51st St., N.Y. 19, N.Y.)

Check 2136 opposite last page.

are  
you  
shutting  
out  
sales?



*consider the odor factor...*

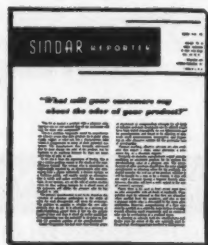
How many products have every chance for success, yet somehow never quite make it... because the odor factor is wrong. This important sales-motivator... so often misunderstood and frequently overlooked... can spell the difference between marketing success and failure. And right there is where Sindar can help you with its tremendous facilities and high degree of specialization in the field of odor.

Whether your problem is simply one of masking out an unpleasant odor, or creating a new and proper selling fragrance... call in Sindar. No other firm has helped so many industrial and consumer products to better sales through proper understanding of the odor factor.

FREE! Send for the Sindar Reporter... our house publication that discusses the odor factor in detail for industrial products and problems. It's filled with important technical and marketing information that could be vital to your manufacturing and selling program. Receive it regularly without obligation. Write today.

**SINDAR** Corporation

321 West 44th Street, New York City



Check 2137 opposite last page.

## CHEMICAL MATERIALS

**Heat-reactive polymer  
combines low cost  
with light color**

Uses: Resin has been used profitably in preparation of fast-drying varnishes, enamels, concrete curing compounds, printing inks and adhesives. A special grade is available for use in rubber compounding.

Features: Highly aromatic



Cost of heat-reactive hydrocarbon resin is reported to be considerably lower than equivalent-colored coal tar resins

polymer possess light color, excellent solubility and resists moisture, acids and alkalis.

Description: Olefinic polymer contains unsaturated double bonds. It is neutral and unsaponifiable. Resin is soluble in aliphatic, aromatic and chlorinated hydrocarbon solvents as well as raw and bodied oils, non-drying oils, resins, plasticizers and rosin. It is also compatible with natural and synthetic rubbers including chlorinated rubber.

### Typical Properties

Softening point °F (ball and ring)	215
Color, Gardner scale	11
Coal tar scale	2
Specific gravity	1.11
Pounds per gallon	
Solid resin	9.25
70% solids in mineral spirits	8.4
Viscosity, Gardner	
70% solids in toluol	0
In mineral spirits	2
Acid number	less than 1
Bromine number	55
Iodine number	180
Ash, %	less than 0.1

Polymer is available as a solid resin in disposable steel



POSITIVE CONTROL OF MATERIALS FLOW



There's a  
BETTER way  
to Proportion  
LIQUIDS TO  
SOLIDS!



Does your present proportioning system suffer from short range limitations? Can one unit run empty and waste ingredients... spoil end product? B-I-F offers a new concept in the control of liquid to solid proportioning in the combination of its continuous dry materials weigher and its closed loop metering system. Fail-safe system — automatically stops when either unit is empty... prevents ingredient waste and product spoilage. Forced balance weighing principle provides wide range, greater accuracy. System governed by simple gravity flow... operates automatically, continuously... features explosion-proof construction!

## Free Facts

B-I-F continuous liquids-to-solids proportioning system adapts to a wide range of applications. Spray nozzle easily applied on liquid unit. Request complete details... write for free facts today!



**Industries**

A DIVISION OF THE NEW YORK AIR BRAKE COMPANY

387 HARRIS AVENUE, PROVIDENCE 1, RHODE ISLAND

Check 2138 opposite last page.

CHEMICAL PROCESSING

drums, 420 lb net. It can also be supplied as a flaked resin in multiwall bags or as a resin solution of 70% solids in mineral spirits. Heat reactivity in cooking, curing or baking cycles yields a tough, flexible and mar-resistant film. Resin has good leafing properties in metallic paints.

In rubber compounding, product improves processing, raises heat resistance and promotes retention of high tensile strength and resistance to abrasion.

(Piccodiene 2215 olefinic heat-reactive polymer is a product of Pennsylvania Industrial Chemical Corp., Clairton, Pa.) Check 2139 opposite last page.

#### Improved dry strength offered to paper by acrylic

Uses: Resin is recommended to improve dry strength and wet properties of paper and paperboard.

Features: Resin was described by the manufacturer as particularly effective on board chemical pulps and groundwood pulps, showing a significant increase in burst and improvements in tensile, fold and pick.

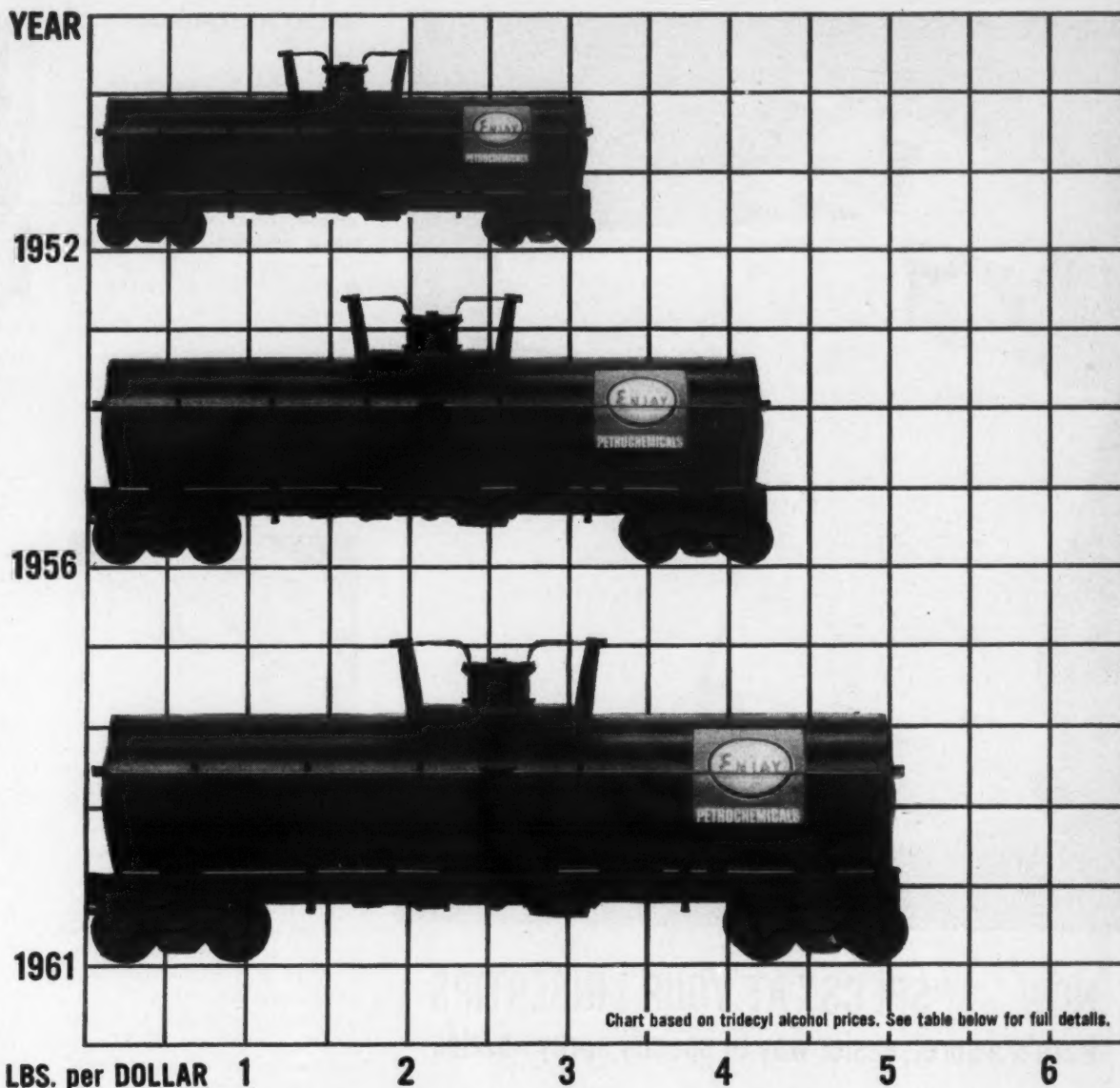
Description: Product is a copolymer of acrylamide and acrylic acid. With mechanical pulps, resin demonstrates an effectiveness in improving dry strength in mixtures above a sulfite-groundwood ratio of 50%. Product is also reported to help in fiber and filler retention as well as in improved rosin retention along with improved wet web strength on the wire.

(Mydel 550 resin is a product of The Dow Chemical Company, Midland, Michigan.)

Check 2140 opposite last page.

Sulfonated polystyrene cation exchanger resin is detailed in 12-page guide that includes charts and tables of chemical specifications, operating characteristics and recommended design data. "Ionac C-240 Guide" — Ionac Chemical Corporation.

Check 2141 opposite last page.



## LOWER PRICES MEAN YOUR DOLLAR BUYS UP TO 60% MORE ALCOHOL THAN IN 1952!

Expanded facilities, increased sales and production economies have enabled Enjay to pass substantial savings along to its oxo alcohol customers over the years. The table at right shows you how much more isooctyl, decyl, or tridecyl alcohol your dollar buys today as compared to 1952.

At the same time, the quality of Enjay alcohols is constantly being improved. Enjay also stands ready

with technical assistance on any problems you may have. These are two added advantages of dealing with a leader in the chemical field.

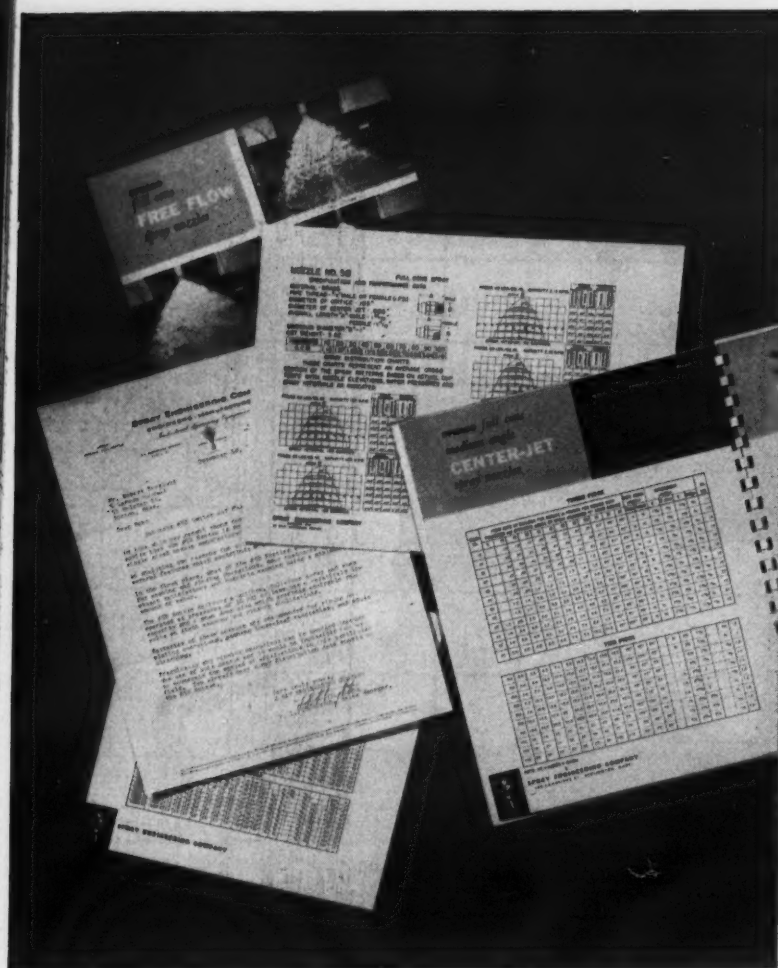
For more information on the full line of Enjay alcohols and chemicals, write to Enjay, 15 West 51st Street, New York 19, N. Y.

YOUR ALCOHOL DOLLAR BUYS:			
	1952	1956	1961
ISOCTYL (lbs.)	3.8	4.8	5.6
DECYL (lbs.)	3.6	4.8	5.6
TRIDECYL (lbs.)	3.1	4.2	5.0

EXCITING NEW PRODUCTS THROUGH PETRO-CHEMISTRY  
**ENJAY CHEMICAL COMPANY**  
 A DIVISION OF HUMBLE OIL & REFINING COMPANY



Check 2142 opposite last page.



## NOW... "SPECS" AT YOUR FINGERTIPS

Here's a surer, easier way to specify spray nozzles



How can you be sure you're specifying the *right* spray nozzle for your particular application?

Spraco's research department has taken the guesswork out of this problem by preparing complete and accurate performance data for each of the hundreds of spray nozzles in the Spraco line. Each nozzle "profile" is complete with data on material, dimensions, flow rate, pressure, angle of

spray... everything you need to enable you to choose, at a glance, the nozzle that will deliver maximum performance and efficiency in your particular application.

No matter what your spray nozzle problem, Spraco makes this information available to you absolutely free. Why not write and ask about it — today?

**SPRACO ENGINEERING COMPANY**  
105 Cambridge Street, Burlington, Mass.

# SPRACO



Check 2143 opposite last page.

## CHEMICAL MATERIALS

### Silicone gives urethane cell structure similar to natural sponge

Two silicone additives will enable foam producers to make urethane sponge with cell structure similar to that of natural sponge. Materials make it possible to control sponge cavity shape, from oval to smaller, irregular and elongated form. Selective combination of the additives produces near natural pore structure.

Soft, flexible, abrasion resistant and highly absorbent



Urethane sponge approaches natural sponge cell structure

characteristics of urethane sponge are retained. In addition, a relatively high coefficient of friction provides high cleaning action value.

Silicone products, C-2-0145 and C-2-0146, are effective at concentrations in range of 0.02 to 0.04%. They are to be used in conjunction with manufacturer's usual silicone cell control additive, not as substitutes.

(Silicone additives C-2-0145 and C-2-0146 are products of Dow Corning Corporation, Midland, Michigan.)

Check 2144 opposite last page.

### Vanadium tetrachloride acts as an excellent chlorinating agent

**Uses:** Product shows promise as stereospecific polymerization catalyst, chlorinating agent and as an intermediate in preparation of organometallics. It can also be used as a starting material for

**Process equipment problems?**

**stops spray dryers improves pump op**

**Produces chemical lime with 20% less fuel**

**Taming Phosphoric Acid Evaporations**

**Smash TiO<sub>2</sub> down to 14 micron on tonnage basis**

**Commercial zone refining makes silicon ultraclean**

**See the process equipment editorial department**

high purity metal and inter-metallics.

**Features:** Vanadium tetrachloride is an excellent chlorinating agent which will react at room temperature with ethylene to form ethylene chloride and  $\text{VCl}_3$  and with toluene to form several chlorinated derivatives,  $\text{HCl}$  and  $\text{VCl}_3$ .

**Description:** Product is a dark red-brown liquid with a density of 15.1 lb/gal. It is sensitive to heat and light and reacts violently with water. At elevated temperatures  $\text{VCl}_3$  will attack paraffinic hydrocarbons but not chlorinated solvents such as carbon tetrachloride or ethylene chloride.

Although toxic limits have not been established,  $\text{VCl}_3$  should be regarded in the same manner as other heavy metal chemicals. Ampoules should be chilled in ice before opening. Operator must wear rubber gloves and apron and a face shield, and he should work in a hood.

(Vanadium tetrachloride is a product of Anderson Chemical Company, Div. of Stauffer Chemical Company, 380 Madison Ave., New York 17, New York.)

Check 2145 opposite last page.

## ARE YOU

### A CARTOONIST?

If so, you can recognize humorous incidents in chemical processing operations that can be turned into profits for you.

**CHEMICAL PROCESSING** will pay:

\$10 for black ink cartoons (with gag lines) on 8½" x 11" sheets — ready to reproduce — payable on acceptance.

\$5 for cartoon ideas — written descriptions or rough sketches of scenes — and captions

Send your cartoon material to:

Cartoon Editor  
**CHEMICAL PROCESSING**  
111 East Delaware Place  
Chicago 11, Illinois

Don't forget to include your name, address, and company affiliation.



## Get low-cost bulk with lightweight Celite Fillers

If your formulation requires a high-bulking filler that is chemically inert, Celite® diatomite is the cost-cutting answer. Because Celite particles contain up to 93% air space, as little as 7 pounds will bulk to a full cubic foot. Depending on grade, Celite has up to 3 to 6 times higher bulk, 2 to 3 times better absorption, and superior chemical inertness, as compared to kaolin and attapulgite-type clays.

Celite is also valuable where high absorption is necessary. It can absorb up to double its weight of liquid. Processed from the world's largest and pur-

est diatomite source, Celite has the highest degree of uniformity in the industry. What's more, you can choose from the widest selection of standard and special grades.

For full details, write Johns-Manville, Box 325, New York 16, N. Y. In Canada: Port Credit, Ont. Cable address: Johnmanvil.

**JOHNS-MANVILLE**



Check 2146 opposite last page.

# DAWE'S

a dependable source for

## SODIUM GLUCONATE and GLUCONIC ACID

*Promptly available in any quantity.*

*Warehouse stocks across the country.*

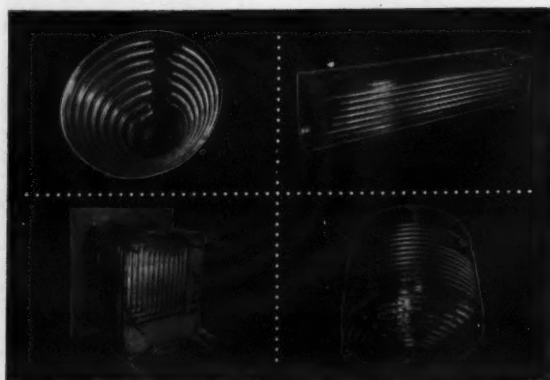
*Dawe's high quality is assured.*

*Write for technical data and samples.*

**DAWE'S  
LABORATORIES, INC.**  
4800 South Richmond Street  
Chicago 32, Illinois

*Dawe's*

Check 2147 opposite last page.



BUILT TO SPECIFIC HEAT TRANSFER REQUIREMENTS

## PLATECOIL® solves process heating and cooling problems

Tranter PLATECOIL eliminates engineering and fabricating pipe coils for a wide variety of heat transfer requirements. Tranter will deliver to you, the complete package required for any specific need—including the vessel itself. PLATECOIL provides high heat transfer efficiency and low operating and maintenance costs.

*PLATECOIL can be furnished to comply with ASME Code*

For complete data, write for Bulletin P-54.

Manufactured in Canada by Brodie Industries, Ltd., 44 Upjohn Rd., Don Mills, Ontario



heat transfer specialists

**TRANTRER MANUFACTURING, Inc., LANSING 9, MICHIGAN**

Check 2148 opposite last page.

## CHEMICAL MATERIALS

**Emulsify water and oil  
with paint vehicle  
for exterior use**

Uses: Paint vehicle was developed specifically for use in exterior paint systems to combine convenience of a water system with traditional quality and desirable features of linseed oil.

**Features:** Vehicle makes it possible to emulsify water and vacuum-bodied linseed oil into a potential one-coat system.

**Description:** Paint vehicle, designated Formula 1308, has a solids content of 60% and an average particle size of less than one micron.

Product has been evaluated on exposure panels and test houses for more than two years. Paints are blister re-



Blister box test shows effects of heat and moisture on a variety of exterior coatings. Formula 1308 paint (upper right and upper left) showed no blistering compared to conventional linseed oil paint (lower left) and commercial latex (lower right)

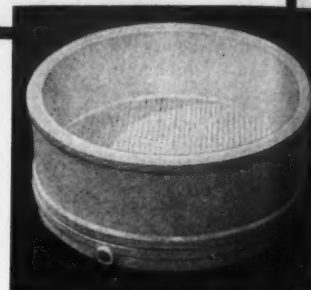
sistant on new wood, even when zinc oxide is added. After 30 months of test fence exposure, paints formulated from 1308 with zinc oxide had excellent durability, showed less chalk, mildew and dirt collection, and remained whiter than conventional oil house paints.

(Formula 1308 paint vehicle is a product of Cargill Incorporated, 200 grain Exchange Bldg., Minneapolis 15, Minn.)

Check 2149 opposite last page.

## New BENCH-TYPE LAB FILTER

2-PIECE  
VACUUM  
FILTER  
for  
LAB OR  
PILOT  
PLANT  
USE



Can be direct connected to drain line where filtrate is waste, or to vacuum bottle if filtrate is to be retained. Two sizes: 2 gal. and 7 gal. working capacity; 12" and 20" I. D. respectively. Even the largest size is less than 10" high. Made from white chemical porcelain. Other chemical ceramic vacuum filters in capacities up to 300 gal. **Write for Bulletin F-40**

287G-3

CHEMICAL CERAMICS DIVISION

**The U. S. STONWARE Co.**

Akron 9, Ohio

Check 2150 opposite last page.

## SPRAY-ON epoxy resin powder guards against corrosion



Now from 3M, a 100% epoxy resin powder you can spray on fittings, pipe (inside and outside diameters) couplings, and valves for positive corrosion protection. "SCOTCHKOTE" Brand Protective Resin No. 101 resists attack by hydrocarbons, fuel oil, gasoline, kerosene and most chemicals. Comes ready to use in one-part powder form. Liquefies on contact and cures to a tough, smooth, impact resistant finish in less than 60 seconds. Discover how "SCOTCHKOTE" Protective Resin can serve your needs: for free technical bulletin, write: 3M Co., Dept. EA0-121, St. Paul 6, Minn.

**3M MINNESOTA MINING & MANUFACTURING CO.**

"SCOTCHKOTE" IS A REGISTERED TRADEMARK OF 3M CO., ST. PAUL 6, MINN.

Check 2151 opposite last page.

CHEMICAL PROCESSING

## NEW LITERATURE

### Chemical Materials

**Polystyrenes, general purpose** grades as well as modified impact, are discussed in detailed technical bulletin. Mechanical, physical, optical, thermal and electrical properties are given for each grade along with specific descriptions of each granulation. Bul S-61 — Solar Chemical Corporation.

Check 2152 opposite last page.

**Aliphatic organic chemicals** catalog lists some 150 different products along with specifications and typical applications. Fatty acids, amines, quaternary ammonium chlorides and ethoxylated chemicals are among the products described. "Aliphatic Organic Chemicals" — Armour Industrial Chemical Company.

Check 2153 opposite last page.

**Aldehydes receive close scrutiny** in 45-page booklet that includes information on physical properties; constant-boiling mixtures; specification limits; storage, handling and shipping; toxicological properties; and selected literature references. Bul F-5278E — Union Carbide Chemicals Company, Div. of Union Carbide Corporation.

Check 2154 opposite last page.

**Sorbic acid** and potassium sorbate are detailed in 30-page technical bulletin. Specific applications are outlined completely and experimental applications presented in condensed form. Toxicology, assay methods, legal regulations and considerations, and storage and handling also receive attention. Bul 101 — Chemical Sales Division, Charles Pfizer & Company, Inc.

Check 2155 opposite last page.

**Alkylated phenols' physical and chemical properties, structural formulas and major uses and applications** are given in technical bulletin. In addition a typical resin reaction is described from the mixing of reactants to the end product. Bul T-205 — Tar Products Division, Koppers Company, Incorporated.

Check 2156 opposite last page.

**Emulsifiers for the manufacture of soluble oils and emulsifiable solvents** are reviewed in seven-page industrial research bulletin. Topics covered include blending instructions for a variety of formulations, and a discussion of metal cleaning and degreasing. Petromix EOS Bul — Sonneborn Chemical and Refining Corporation, Div. of Witco Chemical Company, Inc.

Check 2157 opposite last page.

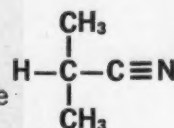
# 3 NITRILES

...now available in commercial quantities

Acetonitrile  $\text{CH}_3\text{C}\equiv\text{N}$

n-Butyronitrile  $\text{CH}_3\text{CH}_2\text{CH}_2\text{C}\equiv\text{N}$

Isobutyronitrile



To the best of our knowledge, these aliphatic nitriles have heretofore been available only on a limited basis. And, because of their limited availability, they have rarely been evaluated as commercial processing materials for large scale operations. Now comes Eastman with a new and unique process for the manufacture of these aliphatic nitriles. We suggest that a much closer study of their interesting properties is in order.

**Acetonitrile** is already in use as an efficient solvent in several industrial processes. In the extractive distillation of butadiene, acetonitrile has been substituted for acetone to increase the throughput of butadiene feed-preparation. The advantage of acetonitrile over acetone lies in its greater effect in spreading the boiling points of  $\text{C}_4$  hydrocarbons in the mixture being distilled. Acetonitrile is also used in the preparation of vitamin  $\text{B}_1$ ; in the extraction of free fatty acids from fish liver oil; in the removal of tars and phenols from petroleum hydrocarbons; and as a medium for promoting reactions that involve ionization. Acetonitrile may be chlorinated to give trichloroacetonitrile, useful as a fumigant.

**n-Butyronitrile** is a clear, colorless liquid with applications indicated as an intermediate in the synthesis of industrial, pharmaceutical, and specialty chemicals. n-Butyronitrile undergoes the reactions typical of the lower aliphatic nitriles. The most common reaction is hydrolysis which occurs under the influence of either acids or bases. Under careful control, n-butyramide may be isolated. Under more vigorous conditions, hydrolysis proceeds all the way to an acid, if an acidic medium is employed. In the presence of a base, the salt is formed.

**Isobutyronitrile**, with its reactive nitrile group and compact molecular structure, offers interesting possibilities as a route to new products. It can be selectively hydrolyzed to produce isobutyramide, completely hydrolyzed to produce isobutyric acid, or hydrolyzed in the presence of alcohols to produce the corresponding isobutyrate ester. In the presence of excess ammonia, isobutyronitrile is catalytically reduced to mono- and diisobutylamines. It has been converted to methacrylonitrile by vapor-phase oxidation over catalysts such as activated vanadium oxide on a neutral carrier. Yields as high as 65% have been reported. Isobutyronitrile reacts with primary alcohols and hydrogen chloride to form the imidoether. Reduction of isobutyronitrile with polyhydric phenols forms corresponding isobutyryl derivatives. Ketones may be formed by hydrolysis of the magnesium salt of a ketoimide, produced by the addition of an alkylmagnesium salt to isobutyronitrile.

**Physical properties and latest specifications** for these Eastman nitriles are obtainable on request. For more information and suggested applications, call your nearest Eastman representative, or write to us at Kingsport, Tennessee.

## Eastman CHEMICAL PRODUCTS, INC.,

Subsidiary of Eastman Kodak Company, KINGSFORT, TENNESSEE

**SALES OFFICES:** Eastman Chemical Products, Inc., Kingsport, Tennessee; Atlanta; Boston; Buffalo; Chicago; Cincinnati; Cleveland; Dallas; Detroit; Greensboro; North Carolina; Houston; New York City; Philadelphia; St. Louis.

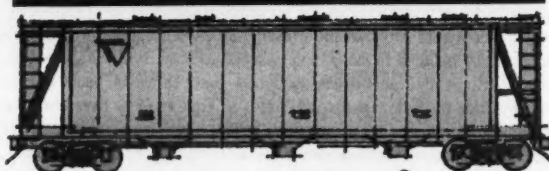
**Western Sales Representative:** Wilson & Geo. Meyer & Company, San Francisco; Los Angeles; Salt Lake City; Seattle.

Check 2158 opposite last page.

# 18

## MAJOR CHEMICAL COMPANIES

NOW SHIP RESINS IN THE NEW



### DRY-FLO CHEM CAR

Airslide® and Dry-Flo® Car Division

## GENERAL AMERICAN TRANSPORTATION CORPORATION

135 South LaSalle Street • Chicago 3, Illinois



Offices in principal cities

Check 2159 opposite last page.

patented nozzle for pneumatic unloading.

The DRY-FLO CHEM car is built with three separate compartments, each with its own nozzles and hatches. Exterior carlines—pioneered by General American—provide a smooth unbroken ceiling surface and hopper corners rounded on a 2½" radius minimize product retention inside the car.

Write for details.

### CHEMICAL MATERIALS

**Gums and enzymes** are two materials described in catalog of processing chemicals. Two-color, 16-page publication furnishes a brief description of each and describes end uses in processing and printing textiles, tanning leather. Cat JWL-100 — Jacques Wolf & Co., Subs. of Nopco Chemical Company.

Check 2160 opposite last page.

**Biochemicals**, including rare sugars, amino acids and derivatives, are comprehensively treated in 46-page catalog. In addition to specifications, systematic names, commonly used synonyms and prices, structural formulas are given for all products. Biochemicals Cat — Pfanstiehl Laboratories, Inc.

Check 2161 opposite last page.

**Flattening agent**, Syloid 978, is subject of technical bulletin that pertains specifically to performance of the compound in preparation of flatted nitrocellulose lacquers via "stir-in" technique. Bulletin incorporates laboratory and plant-scale data. Bul L 70-661 — Davison Chemical Div., W. R. Grace & Company.

Check 2162 opposite last page.

**Foam products**, polyurethane, ceramic, silica, polystyrene and epoxy, are subject of two color charts that tabulate dielectric and physical properties. Foam sheets, both rigid and flexible, as well as a number of foam-in-place and pack-in-place syntactic foams are described. "Foam Products Charts" — Emerson & Cuming, Inc.

Check 2163 opposite last page.

**Alkyl phenols** are described in 12-page brochure that details physical properties, forms, suggested reactions and uses. Solubility and compatibility with other materials are also given. "Alkyl Phenols" — Pitt-Consol Chemical Company, Research and Development Div.

Check 2164 opposite last page.

**Tetrahydrophthalic anhydride's** physical and chemical properties, toxicity, handling precautions and uses are included in 21-page, revised technical bulletin. "Tetrahydrophthalic Anhydride" — National Aniline Div., Allied Chemical Corporation.

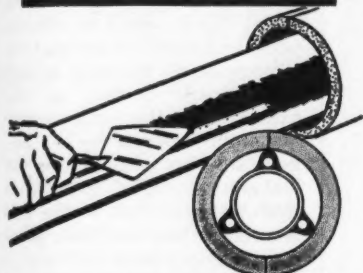
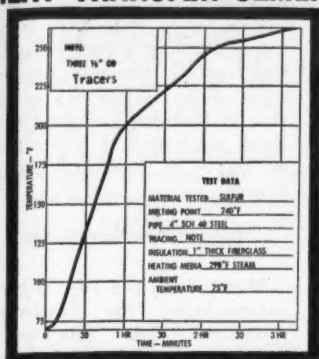
Check 2165 opposite last page.

**Stearates, paint additives, fungicides and plating chemicals** are all found in eight-page brochure. A brief description and application summary are included. "Special Purpose Chemicals For Industry" — Nuodex Products Division of Heyden Newport Chemical Corp.

Check 2166 opposite last page.

### CHEMICAL PROCESSING

# Sulphur Handling is No Problem with THERMON HEAT TRANSFER CEMENT



An increasing number of plants are using Theron Heat Transfer Cement to eliminate sulphur handling problems encountered with internal tracing and steam jacketing. A non-metallic adhesive compound with highly efficient heat transfer properties, Theron Heat Transfer Cement in sulphur installations

- Eliminates misfitting of prefabricated pipe
- Eliminates possibility of cross contamination
- Eliminates need for stuffing boxes and packing glands
- Reduces cost of installation by at least one-half
- Reduces maintenance costs

Theron has been used successfully on pumps, valves and pilot plant and other equipment in sulphur service. Investigate the problem-solving and money-saving properties of Theron, the *proved* solution to heat transfer problems.

Write for Theron Bulletin 300.



1017 Resino • P. O. Box 1901  
Houston, Texas

Check 2167 opposite last page.

DECEMBER 1961

## Read widely . . . From page 27

how well they work.

Without revealing that a handful of such literature-scanning programs have been operating for several years, he describes such a program as a "proposal we have had," and asks friends whether they think it might work. Invariably the answer is: "Perhaps, if you can get people to serve, but you're just not going to get people to work on the committees."

### Program Poses 2 Problems Requiring Solution

The report: Each use of the program has had to devise ways to 1) eject committee members gracefully at the end of their duty tours, and 2) persuade engineers and scientists clamoring for committee service that there is a maximum practicable size and that they will each get a turn.

How else can an interdisciplinary communications program be set up? The technical-information center is the answer that perhaps lends itself best to standardization. When such centers truly stem from real information needs, experience shows that they invariably are interdisciplinary.

Two centers already have been designed for the government by Science Communication, Inc., Washington, D.C. President DeWitt O. Myatt, a chemical engineer long associated with the chemical-process industry, has designed information centers for the Office of Naval Research and the National Science Foundation Antarctic Program. From them he has developed a basic approach for the chemical industry.

Myatt points to three attributes that must be present, his studies indicate, for an information center to be effective:

1) Its scope must be tailored to the user. Technical-society meetings, publications, abstract services and other conventional mass-distribution information services attempt to fit a statistically average user. The technical-information center must know its

users first-hand as individuals.

2) The key staff of a center must be technical. When its members are able to function as compatriots of the users, the center can make a better contribution.

3) Its key function must be technical intelligence. Usually it functions as a service operation as at Du Pont, but sometimes it functions equally effectively as a line function, as is the case with Hercules and at Smith, Kline & French.

In tailoring a technical-information center to meet the needs of its users, Myatt urges that companies proceed only where a genuine information vacuum exists. To set up a center only as a pet project, because it is fashionable, or as an experiment to test a communications theory destroys the rapport between center and user. Its output then is but another mass-produced package. The center's design must derive from its human users, and these users must be questioned carefully and in depth about their true information needs.

### Personal Needs Held To Be Only Important Ones

In surveying potential users of an information center, Science Communication is interested in only what the immediate interviewee regards as his personal needs, not what he thinks he "should" need, and not what he believes other workers need. For this reason, Myatt and his colleagues talk only to bench-level people and operating heads. Says Myatt: "When you interview on any higher level, then you start getting policy answers, not real needs."

Interviews open by gaining the interviewee's confidence and support through discussions of his problems in his language. (This is the toughest part of setting up some centers . . . learning what interest to talk about and learning some of the "okay" terminology.) Skillful interviewers gradually change the interests and terms until the interviews close on a deep dis-

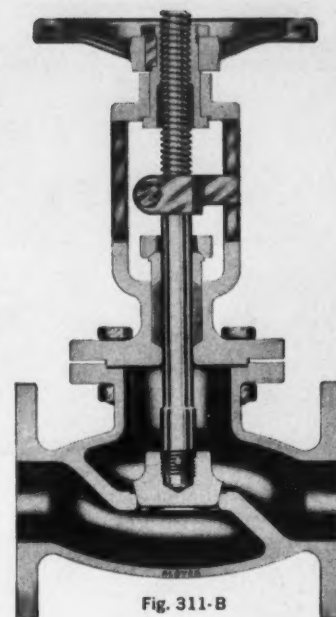


Fig. 311-B

## 7 ADVANTAGES OF THE NEW ALOYCO GLOBE VALVE DESIGN!

Redesign of sizes 2 inches and larger involves conversion from a rotating stem with rising handwheel and free floating disc to a non-rotating stem, non-rising handwheel with disc assembly pinned to the stem. Advantages include:

- No spiral wear pattern on stem from hardened packing or hard deposit in stuffing box.
- Rapid visual check of throttling control by observing location of stem stop.
- No galling of back seat because of rotating stem.
- No galling between seat and disc.
- Stronger disc to stem connection.
- No spinning of disc.
- Less corrosion attack because of elimination of cavity between stem and disc.

For more information on these Alloyco valves of Stainless Steel and other corrosion resistant alloys, write for Bulletin #7, Alloy Steel Products Company, Inc., 1302 West Elizabeth Avenue, Linden, New Jersey. 110

Subsidiary of



ALLOY STEEL PRODUCTS COMPANY

Check 2168 opposite last page.



## COLUMBIAN CARBON: for technical service around the world

From the research that has made so many major contributions to the science of carbon-reinforced rubber . . . to the workable, practical ideas that provide greater production efficiency and improved products . . . Columbian's technical service team is rated outstanding throughout the industry! Today, as always, Columbian's technical service is a most potent reason for specifying Columbian blacks!

**COLUMBIAN CARBON COMPANY**  
380 Madison Avenue, New York 17, N. Y.  
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There are Columbian representatives located in these and 35 other countries around the world. To take advantage of Columbian Carbon technical service—no matter where you are located—contact your local Columbian representative.

International distribution

**COLUMBIAN CARBON INTERNATIONAL, INC.**

### Read widely . . .

*From preceding page*

cussion of information problems in communications terms (the interviewer's problems discussed in the interviewer's language).

This very effective technique (having a high correlation with answers derived from other techniques) is but an adroit dodging of the problems surrounding definitions of terms in communications theory.

### 'Opinion Question' Is Key

Myatt calls the key to such interviewing the "opinion question." The interviewee understands what he is being asked. He is asked to answer only for himself or perhaps for a very small working group. By properly setting up the questions, the interviewer leads the interviewee to believe that his answers are the "inherently right" ones and that he need not hedge his answer to conform with what he believes others will say.

Out of many interviews on several projects, Science Communication has developed a list of do's and don'ts for information centers. They should provide:

1) A data-collection and compilation activity with the output distributed as continuously up-dated loose-leaf manuals.

2) Periodic announcement of new sources of information acquired by the service. Many interviewees desired accession lists and abstracts as the vehicles for such announcements. (It is by providing this function, rather than just distributing pertinent information, that nearly any well-organized technical-information center enhances its interdisciplinary aspects.)

3) A newsletter, perhaps in the form of progress highlights as a preface to the accession list.

4) The document collection.

5) Technical-report coverage on meetings.

6) Individual information service delivered by staff members on a "Man Friday" basis.

7) Technical editors with

Check 2169 opposite last page.

enough professional capacity to deal effectively with user engineers and scientists on a man-to-man basis.

8) Appreciable travel.

Technical-information centers do not need to provide:

1) Conventional library services such as book purchases, reprint ordering and document loans.

2) Special correlations or mathematical services.

3) Administrative support in organizing meetings. ■

### Chemical co. enters . . .

From page 34

hold have not been hampered in any way. Alsynite had its own sales force, distributors and dealers . . . all of whom were retained. Of course, these departments took advantage of the additional support that RCI was able to supply.

Unquestionably, these support-costs have cut into the profit picture of the parent company temporarily, but they are intended to help make the new Alsynite division the number-one firm in a fast-growing industry.

Profits are also being squeezed somewhat by problems encountered in increasing production to meet sales of the new Alsynite Division. However, since the Alsynite Division now has RCI's large research and engineering facilities behind it, problems such as increased production will be solved sooner than they would have been, had the acquisition not taken place. Higher earnings soon should be realized. ■

Heat-exchanger booklets, while containing useful data on economics and design of heat-transfer units, also include information on creativity, public speaking, professional advancement and other subjects valuable for engineers. Booklets E-1 to E-9 — Western Supply Company, Heat Exchanger Division.

Check 2170 opposite last page.

# METHYL ACRYLATE ETHYL ACRYLATE

now available  
with only

**15 ppm  
INHIBITOR**

► Distillation, or washing with caustic, to remove inhibitor may be eliminated.

► With such a low inhibitor concentration . . . less catalyst is required to overcome inhibitor; polymerization begins sooner and thus total polymerization time is shorter; there is less tendency for color development due to inhibitor.

Methyl acrylate and ethyl acrylate containing only 15 ppm monomethyl ether of hydroquinone are now available in commercial quantities from Rohm & Haas. Storage stability has been thoroughly tested. Even when exposed for several months to the highest

temperatures expected under the most unusual shipping or storing conditions, these acrylate monomers show no evidence of polymer formation. Grades containing 200 ppm inhibitor continue to be available.

For monomer samples and literature,  
write to Dept. SP-29

**ROHM  
&  
HAAS**  
PHILADELPHIA, PA.



Check 2171 opposite last page.



CP Staff Photo

*Fineness of grind furnished by homogenizer can be adjusted by moving wheel with one hand and noting position on graduated indicator. Material is introduced to unit through line at upper right and leaves through line at lower right. Note ball valve on exit line*

**Problem:** Both stator and rotor of mill formerly used for grinding ingredients of latex coatings for wall coverings had to be replaced once a month.

**A  
NEW SOLUTIONS  
FEATURE**

The mill also did not turn out as much production as was desired. An even more troublesome problem was that fineness of grind would vary. With this variation in grind, the full value of pigments was not obtained. For this reason, it was sometimes difficult to make one batch of coating match another in color.

Another disadvantage of the former equipment was that it had to be watched. Since the system was open, dirt could be introduced and air entrapped. Air played havoc with

coatings, causing foaming and changes in viscosity and solids content.

Coating contains pigment ( $\text{TiO}_2$ ), filler (clay, calcium carbonate and asbestos), water, dispersing agent and plasticizer. It is necessary to emulsify the plasticizer in the dispersing agent. Two types of the coating are made: an undercoat which has 65% solids and a topcoat which has 69% solids. Thickener and latex are not added until after the grinding operation, because latices cannot stand the shear force and will break down, if ground.

**Solution:** While attending the Exposition of Chemical Industries in New York City in December 1957, representatives of Standard Coated Products saw a homogenizer whose

Sparked by an idea developed at a Chem Show, company decreases labor requirements and cuts maintenance costs in grinding operation for latex coatings used for wall coverings

## Homogenizer saves company \$22,000 per year

By **GORDON WEYERMULLER**, Senior Associate Editor  
with **ERNEST E. POLLIER Jr.**, Superintendent  
Standard Coated Products, Incorporated  
Buchanan, New York

design indicated it would do a better job in the grinding operation than the mill then in service.

Known as a Tri-Homo disperser-homogenizer, the machine draws product inside by means of a worm impeller. Mixing action is provided by the impeller, which then forces material into the annular space between the first of three surfaces of the adjustable rotor and stator. The first rotor surface is the smallest in size; the next one, larger; and the third, the largest. Each of these, in turn, furnishes a smearing, hydraulic shearing and emulsifying action on the particles. Adjustment controls rate of flow, working time cycle between surfaces and particle size.

The unit was purchased and placed in service in December 1958. Cost was approximately \$7000. The homogenizer was directly connected to a mixing tank above, which feeds the unit, and to a tank below where ground material is stored.

**Results:** Homogenizer has required practically no maintenance during the period of more than 2½ years it has been in service. An engineered

shaft seal was installed to replace a rubber seal. Rotor and stator, which are made of Ni-Resist, are still in good condition.

While the former mill took three hours to grind 10,000 lb of the undercoat, the homogenizer can grind the same amount in an hour. The previous mill required four to five hours to grind 13,000 lb of the topcoat, while the homogenizer handles the same quantity in less than two hours.

The homogenizer operates about 10 hr per day, grinding enough material for the remainder of the plant to run 24 hr. Some experimental coatings are ground during this period. The former mill would have had to operate nearly 24 hr just to keep up with production. On a volume basis, the homogenizer handles about 500-600 gph through a 100-mesh screen, compared to about 250-300 for the mill.

The homogenizer does not have to be watched closely. It operates automatically.

As a result of the decreased maintenance and lower labor requirements, the homogenizer is saving the company \$22,000 per year.

In addition, the homogenizer

is a major factor in the high quality of the Sanitas wall coverings made by Standard Coated Products. Close control over fineness of grind provides a good color match between individual batches. Elimination of air and foreign matter helps quality. Close control over viscosity and solids content made possible by the homogenizer also are factors in high quality of wall coverings produced.

The homogenizer is quiet and does not vibrate. It can also be cleaned easily.

Ten 1-2" ball valves are used on lines connected to the homogenizer. Ball valves have been found to be much better than the previous type used, in that ball valves provide trouble-free service and require practically no maintenance. Since they are non-lubricated, the possibility of contaminating the product from this source is eliminated.

(No. 12 homogenizer-disperser is product of Tri-Homo Corporation, 98 Highland Ave., Salem, Mass.)

Check 2172 opposite last page.

(Ball valves are product of Jamesbury Corporation, 64 New Street, Worcester, Massachusetts.)

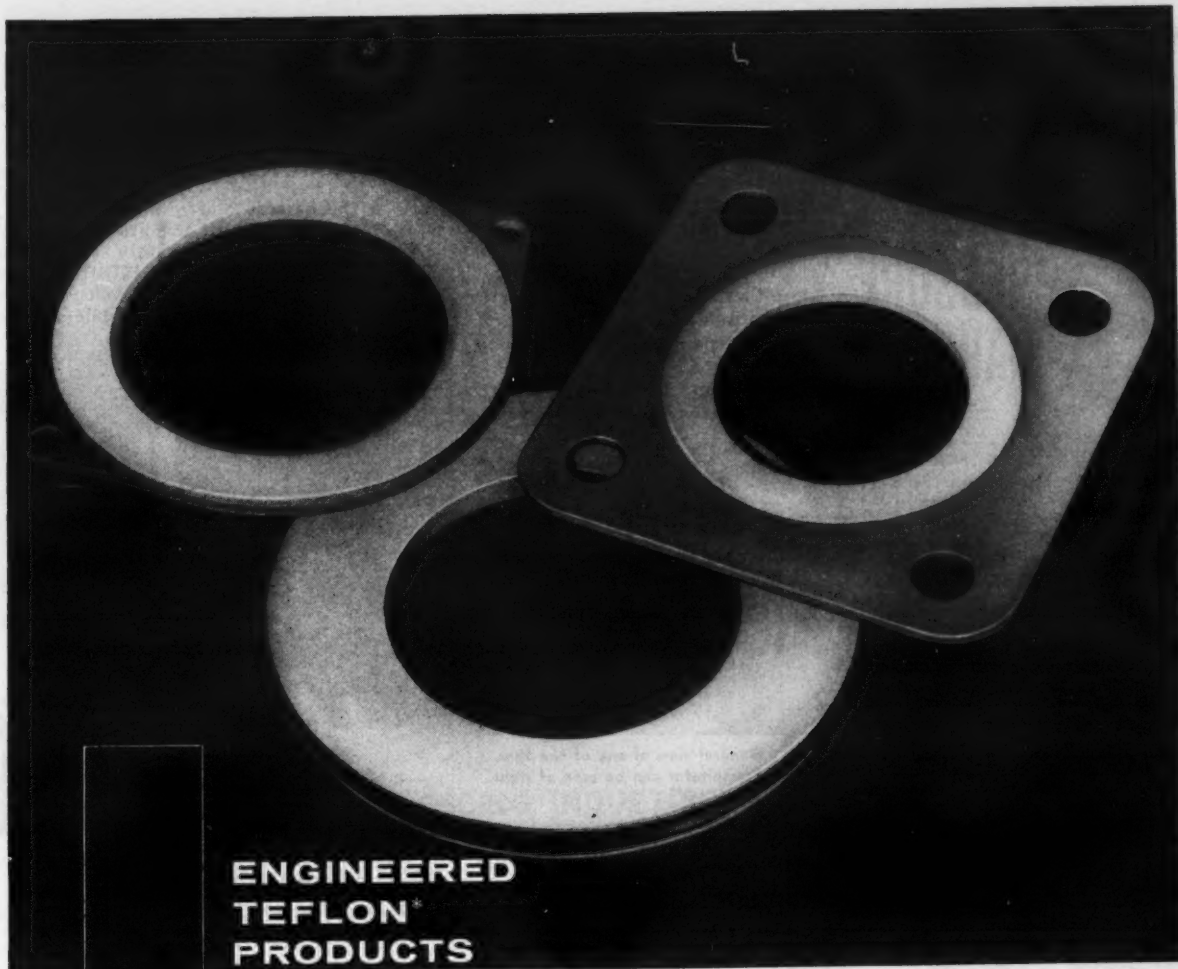
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► A NEW SOLUTIONS ARTICLE  
**Twin precipitators reclaim \$125,000 per yr worth of LIA10<sub>2</sub> at Foote**

**Problem:** Approximately 54 tons of lithium aluminate per day were being lost with exhaust gases leaving two 10 x 340' kilns at Foote Mineral's ore extraction plant in Sunbright, Virginia. Exit gas temperatures range from 475 to 520°F. Gas volume is about 73,500 cfm per kiln.

Lithium aluminate is an intermediate in Foote's thermochemical process for producing lithium hydroxide from spodumene ore.

**Solution:** In addition to existing dust chambers and cyclone collectors serving the kilns, two outdoor electrostatic

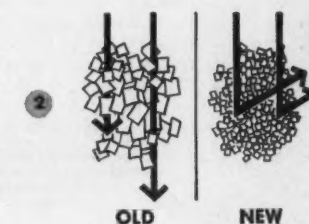
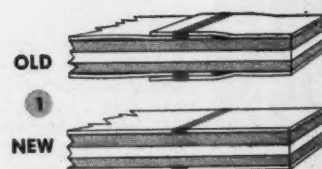


for  
Chemical  
Processing

New, improved Garlock Teflon-Jacketed Gaskets offer distinct advantages on glass-lined equipment. Two new design innovations have been added to the formed-shield type of gasket: (1) ends are now butt-welded instead of overlapped, resulting in a face of uniform thickness and elimination of "lump" at the seam; (2) a new, high-quality grade of Teflon is used, resulting in less permeability and chance of mechanical failure.

For positive sealing to withstand—but not contaminate—reactive blends, batches and mixtures, apply Garlock Teflon-Jacketed Gaskets. Wide variations of styles, filler materials, and sizes can be furnished to suit practically all process equipment including glass-lined piping, flanges and fittings. Call your local Garlock representative at the nearest of the 26 Garlock sales offices and warehouses throughout the U. S. and Canada. Or, write for Catalog AD-154. Garlock Inc., Palmyra, N. Y. Canadian Div.: Garlock of Canada Ltd. Plastics Div.: United States Gasket Co. Order from the Garlock 2,000 . . . two thousand different styles of Packings, Gaskets, Seals, Molded and Extruded Rubber, Plastic Products.

\*DuPont Trademark



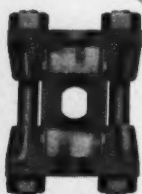
# G A R L O C K

Check 2174 opposite last page.

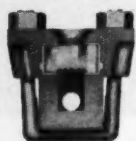
# Strahman

## HIGH PRESSURE GAUGES

FOR  
CHEMICAL PLANTS  
AND  
REFINERIES



THRU VISION



REFLEX  
Single or  
Multiple  
Sections

Multiple section gauges are made with a one piece body chamber. This method of construction, originated by Strahman, has become generally adopted as standard by most gauge manufacturers.

An added safety feature! Except for visibility slot, glass is completely enclosed.

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- Heated or cooled gauges
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- Frost-proof extensions
- Tubular Gauges
- Gauge Cocks

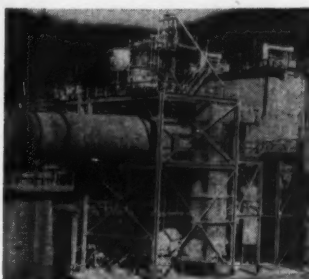
**STRAHMAN**  
VALVES INC.  
NICOLET AVE., FLORHAM PARK, N. J.

## PROCESSING EQUIPMENT

precipitators were installed. The units are located side by side and insulated as one unit, a common wall separating them.

Each precipitator serves a kiln. Suitable ducting permits diversion of gases through either precipitator to permit continued kiln operations if maintenance is needed on one unit.

Exhaust gases from the kilns first pass through the conven-



General view of one of two kilns.  
Precipitator can be seen at right

tional dust collecting equipment before entering precipitators. Dust particles not trapped by collectors receive a high electrical charge, are collected on grounded plates in the precipitators, and shaken into hoppers which feed team of conveyors that return the  $LiAlO_2$  back to the process.

Controls for precipitators are housed in separate building near the units where other plant control equipment is located. Transformer rectifiers, one for each precipitator, are located on roofs of the units.

The transformer rectifiers were designed to boost 440-volt AC supply voltage to as high as 66 kilovolts and then convert it to DC. Normal operating voltage is 45 volts DC. Precipitators automatically restart themselves in event of a short. Only on the third try (recycle) does an alarm sound if shutdown persists. The alarm system also serves the conveying equipment. A pilot light indicates whether trouble is with a conveyor or due to a short.

**Results:** Thanks to the electrostatic precipitators, the plant is now reclaiming up to \$125,000 worth of lithium aluminate annually. Precipi-

# JUSTRITE

## SAFETY CANS AND OILY WASTE CANS

... safety-proved in hundreds of plants!

The hazards of fire and explosion are two of the greatest dangers to plant safety. For more than 50 years, JUSTRITE has specialized in the development and manufacture of safe-

ty cans that have Underwriters' Laboratories and insurance companies' approval. Why not standardize on the safety equipment that has been proved in thousands of situations?



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Check 2176 opposite last page.



## need more information...

Note there is a key number at the end of editorial articles or advertisements. To request more information check the proper number on the convenient form opposite the last page. Send the form to us ... we do the rest. Information comes direct to you. No obligation, of course.

Check 2175 opposite last page.

## PROCESSING EQUIPMENT

tator performance is checked every month. Units are performing with an average efficiency of 97.5%. Stacks losses have been slashed to 0.4-0.5 tons product per day — a reduction of over 99%.

(Electrostatic precipitators were supplied by Buell Engineering Co., Inc., 123 William Street, New York, New York.) Check 2177 opposite last page.

### **Mixers can be converted to either open or closed turbine operation**

**Uses:** Mixing, emulsifying and dispersing low and high viscosity materials.

**Features:** Removable stator sleeve permits either open- or closed-turbine operation. Conversion capability permits wide variety of applications.

**Description:** Stator sleeve can be attached or detached in seconds. Mixers are constructed of stainless steel and are available in either portable and stationary models.

Used for open-turbine operation, units mix and blend materials by moving them simultaneously, vertically from



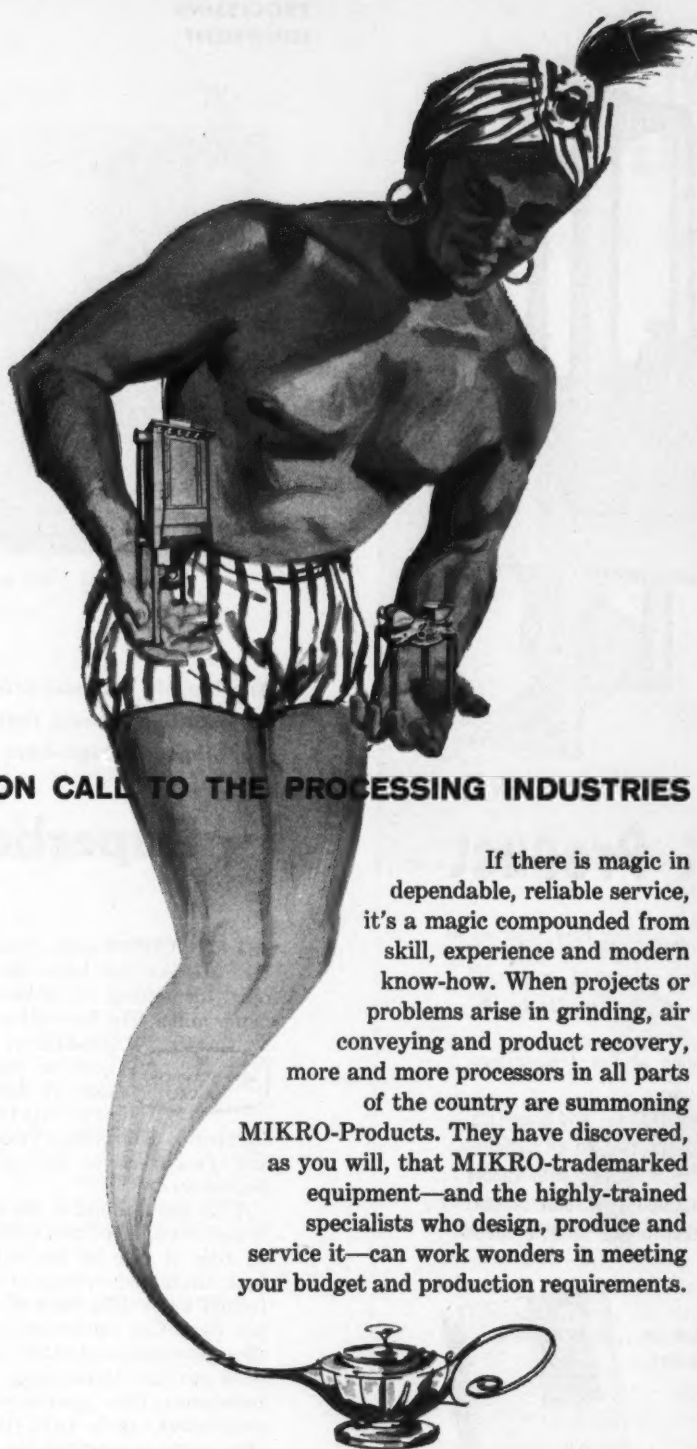
Stator sleeve can be attached or removed from mixer in matter of seconds

bottom to top, and in a circular motion horizontally.

During closed-turbine mixing, products circulate evenly from bottom and sides of mixing container to top. There is no vortex or surface boil.

(Convertible mixers are product of Barrington Industries, Inc. 185 Union Avenue, Providence 9, Rhode Island.)

Check 2178 opposite last page.



## ON CALL TO THE PROCESSING INDUSTRIES

If there is magic in dependable, reliable service, it's a magic compounded from skill, experience and modern know-how. When projects or problems arise in grinding, air conveying and product recovery, more and more processors in all parts of the country are summoning MIKRO-Products. They have discovered, as you will, that MIKRO-trademarked equipment—and the highly-trained specialists who design, produce and service it—can work wonders in meeting your budget and production requirements.

## MIKRO-Products....

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60 Chatham Rd., Summit, N. J.  
A Division of American-Marietta Company

REPRESENTED THROUGHOUT THE WORLD IN SALES, SERVICE AND MANUFACTURING FACILITIES.

Check 2179 opposite last page.



## MEER CORPORATION CONTROLS QUALITY, UPS PRODUCTION WITH MIKRO-Products

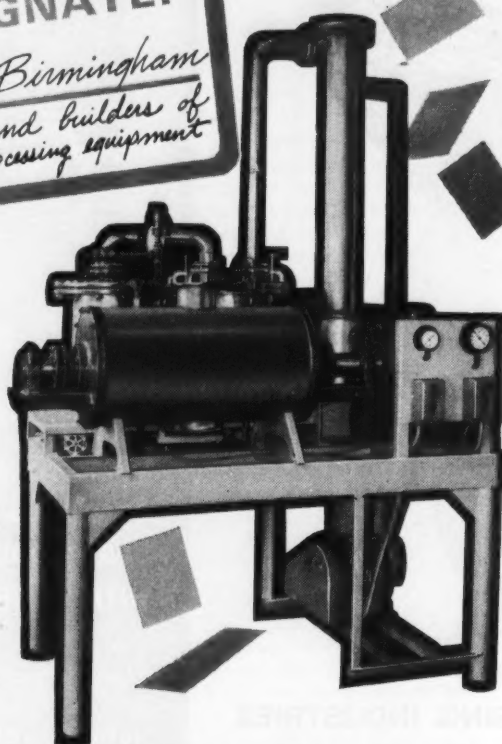
Meer Corporation, Bergen, N.J. employs a unique 3-level automatic milling operation to handle gum arabic. A MIKRO-PULSAIRE Dust Collector serves as a receiver-filter in an air-conveying system which insures a constant high-volume flow of materials between all units in the installation, including a No. 4 MIKRO-PULVERIZER, as shown above. Results are better quality control and virtually doubled production. We'd like to show you how MIKRO-Products can do just such a job for you.

### PROCESSING SYSTEMS



**DESIGNATE:**

*Goslin-Birmingham  
designers and builders of  
quality processing equipment*



## A Most Important Product

Another product of progress by GOSLIN-BIRMINGHAM for a Florida chemical company's research program. This piece of equipment is a laboratory-scale vacuum rotary dryer, 18" in diameter by 36" long.

Its primary function is drying of wet solids at low temperature, and recovering condensate.

The unit has dry and wet dust collectors in the rear and a vertical surface condenser. Stainless steel is used throughout on all surfaces having any contact both with material being dried and with vapors and condensate. The unit is on a self-contained structural support and includes the mounting of a vacuum pump and a variable speed agitator-drive.

Write or call us for comprehensive information on how G-B can help you solve your "special" problem.



**GOSLIN-BIRMINGHAM**

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EQUIPMENT • CONTRACT MANUFACTURING  
including HEAVY CASTINGS

Check 2180 opposite last page.

## PROCESSING EQUIPMENT



Shredding mill (left) processes 17,000 lb of bark per hour

Another old disposal problem whipped . . .

By installing process that converts waste bark from logs into high-heat-value pelletized fuel . . .

## Paperboard mill saves 17

AN EFFICIENT and economical process has been developed for getting rid of bark in paper mills. The first full-scale installation is now in operation at Southern Extract Company, Knoxville, Tennessee, producers of corrugated paperboard.

With the technique, the bark is shredded, dried and pelleted so that it can be burned as fuel. Estimated savings are reported to be 17½ tons of coal per day. The equipment handles approximately 17,000 lb of bark per hour containing 40% moisture. The operation is continuous and automatic. One man can control the entire process.

### An Old Problem

What to do with waste bark has long been a puzzle for the pulp and paper industry. Many mills simply haul the material to dumps, but this is both costly and wasteful. At-

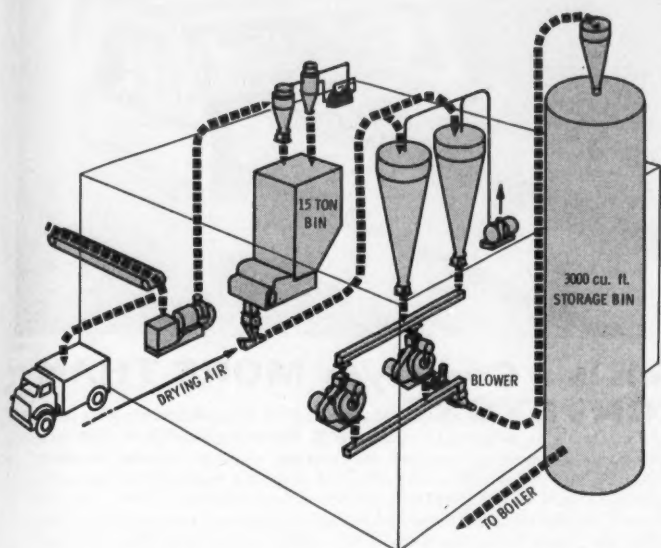
tempts to convert it into salable materials have met with only limited success.

Bark generally amounts to about 15% by volume and 7-8% by weight of the dry wood in the cord. The loosened bark is often burned, but the heating values hardly justify the expense involved. However, the latter does not hold true at Southern Extract where the pellets yield approximately 6300 Btu per lb — equivalent to the soft coal currently in use at the plant.

### Shredding Is First Step

The first step in the drying and pelleting process is the shredding operation. Bark is carried by belt conveyor from the barking drum to a 125-bp hammer mill. After shredding, the bark is moved by air to a 15-ton surge bin. About 2-6% moisture reduction is achieved during the pneumatic conveying.

The surge bin allows for more than two hours' storage.



Schematic of shredding, drying and pelleting system for processing waste bark in paper mills

## 17½ tons of coal per day

This is important since it is essential that uniform feed be provided to the flash-drying system, which comes next in the operational sequence.

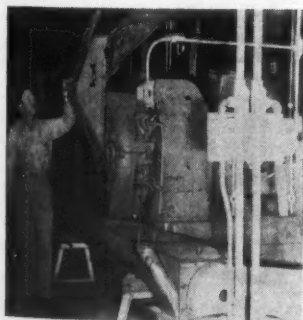
The shredded bark is fed continuously through a rotary air lock into the flash dryer. Heat for the unit is obtained from 500°F flue gases from the mill's coal-fired boilers. The dryer cuts moisture content of the bark down to 15-18%

From the flash dryer's cyclones, the bark is transferred to the pellet mills. There are two units involved, each powered by a 125-hp motor. In the machine, the bark is fed to the inner surfaces of the cylindrical-shaped, perforated die revolving around the mill's rolls. As the die spins, it picks up the incoming material, causing it to be squeezed between the surfaces of the rolls and the die.

### Extruded Pellets Cut Off

The extreme pressure forces and extrudes the bark through the holes in the die. Pellets continue to be extruded until they reach a stationary knife. Here they are sheared off and drop to bottom of the mill where they are discharged.

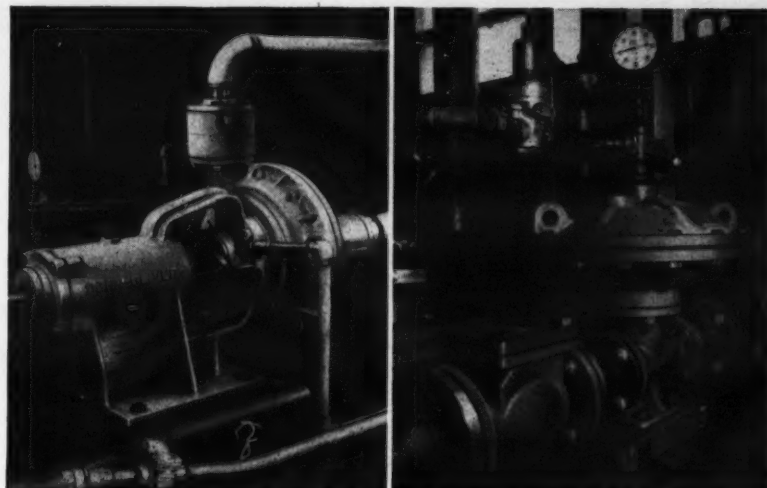
The pelleting operation is continuous. By feeding bark into mills at the correct moisture content, it is unnecessary to use additives, as is often required when pelleting dry chemicals. To next page



Pellet mills are powered by 125-hp motors, produce pellets ½" x 1" long, ready to be metered with coal going to boilers

## DORR-OLIVER SPECIALIZED PUMPS

*solve widely different problems  
at Vanderbilt Chemical*



**Important end products** at Vanderbilt Chemical Corporation, East Norwalk, Conn., are metallic based dimethyldithiocarbamates and diethyldithiocarbamates for use in natural rubber and butadiene styrene rubber products.

**Processing operations** involve problems requiring two entirely different types of pumps, each adapted for highly specialized service. Vanderbilt Chemical solves these problems with the two Dorr-Oliver pumps shown above. At left is the Olivite® lined centrifugal, designed for safe handling of highly corrosive and similar problem liquids. At right is the ODS® diaphragm type pump, designed for transfer of slurries with a high percentage of suspended abrasives.

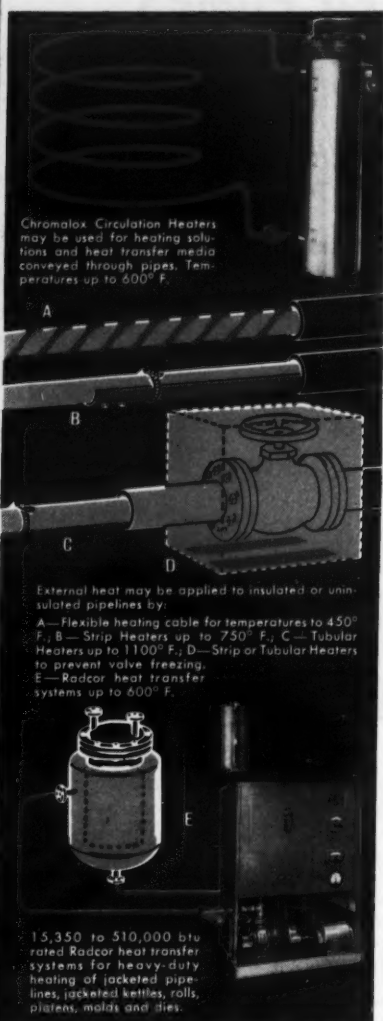
**Twelve Dorr-Oliver units** are now in operation at Vanderbilt Chemical — all with the trouble free, low maintenance characteristics inherent in equipment of Dorr-Oliver design and manufacture. Dorr-Oliver is the only major manufacturer offering three distinctly different pumps designed for chemical process applications — the lined Olivite centrifugal, alloy centrifugal, and ODS diaphragm type.

**For full information** on the right unit for your special application, write to Dorr-Oliver Incorporated, Stamford, Connecticut.

**DORR-OLIVER**  
WORLD-WIDE RESEARCH • ENGINEERING • EQUIPMENT

Check 2181 opposite last page.

## CHROMALOX ELECTRIC HEATING EQUIPMENT For process or protective pipe heating



The Chromalox Electric Heating Units above can provide you with economical and efficient heat for heating pipe lines whether to prevent freezing, maintain free materials flow or provide elevated temperatures for heat transfer media. Among the advantages are around-the-clock dependability, uniform heat transfer, exact temperatures and manual or automatic thermostatic controls. Units are available with operating temperatures up to 1100° F., many from stock for immediate shipment.

FOR HELPFUL HINTS—send for Chromalox and Radcor Literature on Pipe Heating.



**CHROMALOX  
ELECTRIC HEAT**

**EDWIN L. WIEGAND COMPANY**  
7517 THOMAS BLVD., PITTSBURGH 8, PA.

Check 2182 opposite last page.

## PROCESSING EQUIPMENT

The pellets,  $\frac{1}{2}$ " x 1" long, are at a temperature of 145 to 150° F. The pelleting operation causes another 5 to 10% drop in moisture. It also boosts the bulk density of the bark to 35 lb per cu ft.

The reduction in moisture content achieved in the mills is said to boost the heating value of the pellets enough to pay for the power needs of the mills.

The pellets are pneumatically conveyed to a 3000-cu ft storage bin from which they are metered on a proportionate basis with the coal going to the boilers.

Prior to installing the process, numerous tests were run to determine what pellet size would be most suitable. The requirements to be met were that there could be no burnt-out holes in the fuel bed and no unburned coal passed into the ash pit.

The  $\frac{1}{2}$ "-diameter pellet was selected because it most nearly simulated the burning rate of the soft coal that the mill uses.

(Further information about drying and pelleting process may be obtained from Sprout, Waldron Co., Inc., 130 Logan St., Muncy, Pa.)

Check 2183 opposite last page.

### Continuous mixers process up to 100 tons/hr

Line of paddle mixers has been added by manufacturer of impervious graphite equipment. The mixers, made of carbon steel, stainless steel, aluminum or other alloys, can handle a wide variety of materials ranging from iron ore to fine chemical powders.

Units are available in single- or double-shaft models in 14 standard sizes, with continuous capacities from 150 lb to 100 tons per hr. They can also be jacketed, if desired.

(More information about continuous mixers may be obtained from Engineering Department, Falls Industries, Inc., Solon, Ohio.)

Check 2184 opposite last page.



## When is a Conveyor MORE THAN A CONVEYOR?

Manufacturers of products ranging from powdered materials to pickles are using AJAX Vibrating Lo-Veyors for such extra operations as cooling, washing, dewatering, drying, scalping, sorting, aligning, sizing and others. This one machine does the work of two or more for the price of only one. Completely enclosed reciprocating drive unit and spring loaded supporting arms mounted in rubber bushings eliminate head and tail pulleys, idler rollers and bearings. They vastly reduce maintenance costs.

AJAX Lo-Veyors and feeders are available in a wide range of sizes and capacities. Take advantage of the broad experience of AJAX vibration engineers. Write or phone FAirview 6-3121.



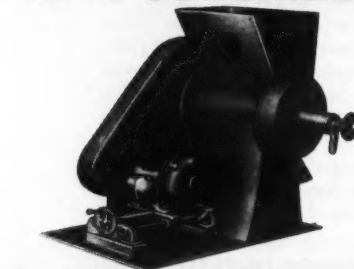
## Conveyor Division

AJAX FLEXIBLE COUPLING CO. INC.  
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Representatives in Principal Cities

Check 2185 opposite last page.

## SPEED UP PRODUCTION WITH-- MULTI SPEED DRY PULVERIZERS & CRUSHERS



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- Easy to clean
- A design and size for every need

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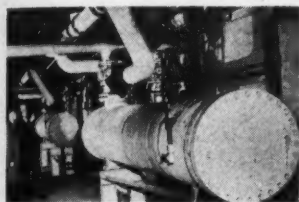
CHEMICAL PROCESSING

▶ A NEW SOLUTIONS ARTICLE  
**Liquid sugar warmed  
 to 90°F at eight gpm  
 by heat exchangers**

Speeds pumping to trucks  
 in cold weather

Use of three compact heat exchangers has simplified the transfer of sugar at Refined Syrups & Sugars, Inc., Yonkers, New York. The shell-and-tube units are used to raise the temperature of the material so that it can be pumped from outdoor storage tanks to tank trucks at 500 gpm — even in coldest weather.

The heat exchangers raise the temperature of the sugar to 90°F at rates exceeding eight



Two of the three shell-and-tube heat exchangers used to warm sugar at Refined Syrups & Sugars, Inc.

gallons per second. From the units, product travels 700 ft through insulated pipeline to tank truck loading area.

Each of the three heat exchangers serve a separate system of storage tanks and pipelines. Heaters are designed to handle 100 psi steam pressure at 250°F. The stainless steel tube bundles are designed for 250 psi at 250°F. Shell diameter is approximately 24 inches. Overall length is 170 inches.

(Heat exchangers were manufactured by the Heat Exchanger Division of The Paterson-Kelley Company, Incorporated, East Stroudsburg, Pennsylvania.)

Check 2187 opposite last page.

For more information on developments reported in this section, check corresponding numbers on Reader Service Slip opposite last page of this issue.

# What Really Happens Inside the Bucket

## Exploding a widespread misconception of the operation of inverted bucket steam traps

In describing the operation of the inverted bucket trap many well meaning people—and some not so well meaning; i.e., competitors—refer to the need for a “bucket full of steam” to close the trap, and a “bucket full of condensate” to open the trap. The implications of these requirements are many. Sometimes they are contradictory. Often they are misleading. Observations of a trap with a glass body and a glass bucket plus trap design considerations tell the true story.

\* \* \*

In a well designed inverted bucket trap (Armstrong, naturally) the bucket will float and close the valve when it is *no more than two-thirds full of steam*. For example, the bucket in an Armstrong No. 812 trap is 3 1/16" deep. It will float with only 2" of steam.

Good design also dictates that the maximum test opening pressure of a trap should be well in excess of the maximum working pressure for which the trap is furnished. For example a No. 812 trap for 100 psi with the bucket filled with cold water should open at a test pressure of at least 165 psi. Therefore, the bucket does not have to fill completely with condensate to open at 100 psi. The entrance of 1.20" of condensate will cause the bucket to sink. .8" of steam remains at the top of the bucket at the time it is heavy enough to open the valve at 100 psig and with no back pressure.

Thus the opening and closing of a 100 psi trap with 3 1/16" deep bucket is controlled by a change in the water level of only 1.20".

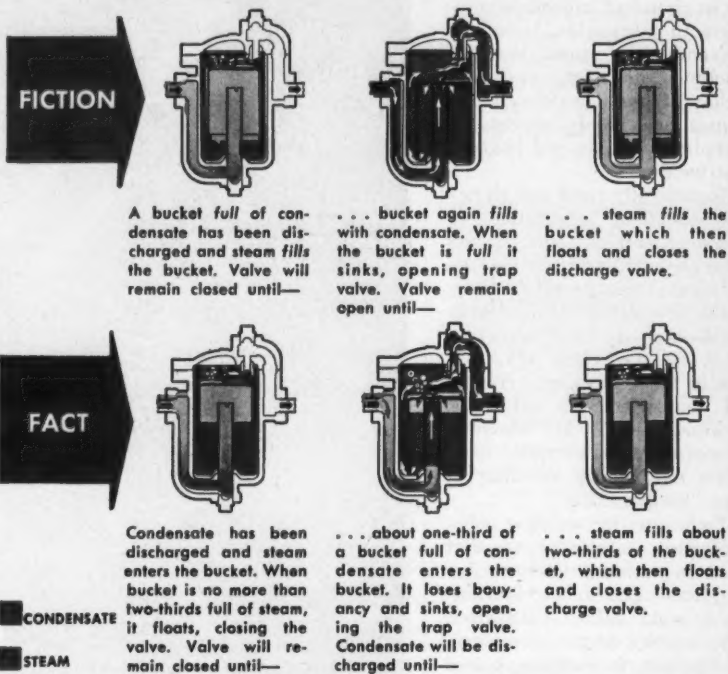
In actual practice the 100 psi trap may be draining a steam main in which daytime pressure is only 30 psig. Instead of requiring a 1.20" rise in bucket water level to open the trap against this pressure, the bucket will be heavy enough to open the valve as soon as the water level in the bucket has risen about 3/16".

Obviously, it does not “take a bucket full of steam” to close the inverted bucket trap, or a “bucket full of condensate” to open the trap.

### What's the Significance?

As illustrated above the opening of an Armstrong Trap requires the accumulation in the trap of less than one-third of a bucket full of condensate. This assures good operating characteristics for the vast majority of services by discharging small accumulations of condensate as soon as they reach the trap. It also assures

### HOW THE INVERTED BUCKET TRAP WORKS



frequent opening pressure drops to break up air and condensate films on heat transfer surfaces and thereby maintain high heat transfer rates in the unit being drained.

Additionally, the fact that no more than two-thirds of a bucket of steam is required to float the bucket means that there will always be a generous water seal at the bottom of the bucket. In the case of the No. 812 trap described above, it will be 1.8" deep. This insures that no steam can leak from the bottom of the bucket. More importantly, the bucket can float to close the valve even when the bucket is not completely submerged in condensate.

### A Proven Principle Engineered Up to the Minute

While the inverted bucket concept for steam traps is half a century old, today's Armstrong inverted bucket traps incorporate design considerations unknown 50 years ago. The inverted bucket of the Armstrong trap, for example, is not just an upside down bucket. It is a carefully sized, weighted and vented component of a steam trap mechanism that experience proves will do its job right. Throughout, Armstrong design has

"See our catalog in Chemical Engineering Catalog"

kept pace with technological advancements, modified when necessary to meet changing requirements.

We do not claim that Armstrong Traps will do every single job better than any other trap. But we do believe it will do more jobs better and more consistently than any other trap. More important, though, for most services, Armstrong Inverted Bucket Steam Traps enable you to get more efficient steam utilization with minimum problems.

We're so sure of what Armstrong Traps can do that we unconditionally guarantee that they will satisfy you. You are the sole judge, too, so there's practically no risk.

\* \* \*

The 48 page Armstrong Steam Trap Book describes other Armstrong features. It also discusses trap selection, installation and maintenance. Ask your Armstrong Representative for a copy or write: **Armstrong Machine Works, 8806 Maple Street, Three Rivers, Michigan.**



## ARMSTRONG STEAM TRAPS

Check 2188 opposite last page.

**Ease of fabrication  
adds to importance  
of polypropylene**

**P**olypropylene's combination of properties make it particularly adaptable to service in chemical process equipment. In fabrication, it can be conveniently formed, worked, machined, shaped, cut and welded. Several welding techniques are highly successful, including hot-gas and heated-tool welding.

Structurally rigid and showing excellent resistance to chemical attack and stress cracking, polypropylene's resistance to heat is outstanding. It has a melting point of over 300°F and a Vicat softening point greater than 185°F. It resists most inorganic chemical reagents, both acid and alkaline, even at elevated temperatures. Aromatic solvents may cause swelling at room temperature.

Technique for welding polypropylene is similar to that used in welding linear polyethylene. For most fabrications, weld values vary from 80% to 100% of parent material strength. In welding, pieces are cut and bent to proper size and shape; then they are clamped to hold the edges together firmly. The welding "torch" consists of a heated stream of inert gas (700°F). A welding rod, made of polypropylene about 1/8 inch in diameter, is laid into the joint while both rod and edges of the joint are being heated by the torch.

Typical examples of polypropylene welded fabrication are rectangular and cylindrical tanks, tank liners, hoppers for conveying equipment, pipe and ducting systems, filtration equipment and smaller portable items such as dipping baskets.

(Based on paper written by F. J. Bockhoff, Fenn College; and J. A. Neumann, American Agile Corporation.)

(For more details on polypropylene processing equipment contact the American Agile Corporation, PO Box 168, Bedford, Ohio.)

Check 2189 opposite last page.



## NOW THEY'RE TRADING SALT FOR SPARKLE...

### *With the Help of 124 Tons of Revere Condenser and Heat Exchanger Tube in Prototype Sea-Water Conversion Plant*

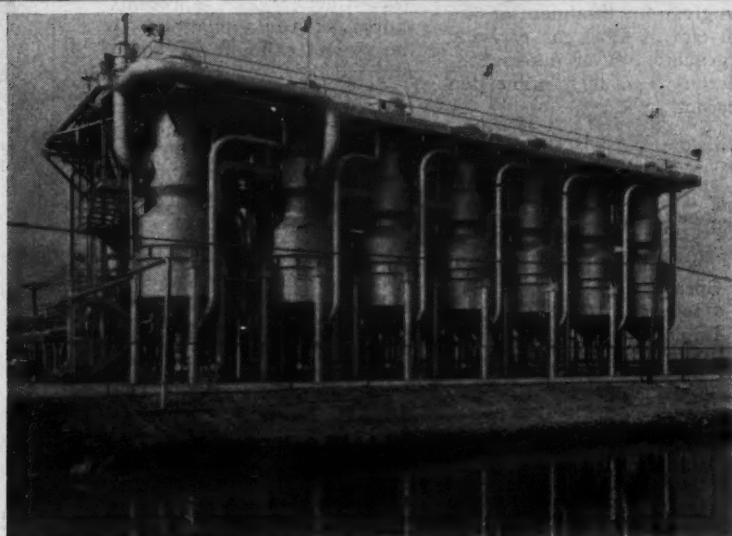
Peculiarly, in a world that is more water than land, there's a shortage in many areas of water fit to drink or use. The very presence of this "useless" sea water has long been a challenge to scientists, engineers and governments.

Recently, announcement was made of the first sea water conversion plant in the United States capable of producing 1,000,000 gallons of fresh water per day. It was designed to convert sea water to po-

table water for man, livestock and for use in irrigation, and was placed on stream experimentally in Freeport, Texas in June 1961, by the Office of Saline Water of the U.S. Department of the Interior.

The unit consists of a 12-effect evaporator that heats the sea water, converts it to steam and manufactures useful water. Here—as wherever heat, pressure and moisture are handled—was another use for Revere Tube.

In one part of the equipment, where the combina-



Freeport, Texas demonstration plant uses a 12-effect evaporator—seven of the effects are shown above. Built for the U.S. Department of the Interior's Office of Saline Water by CHICAGO BRIDGE & IRON COMPANY, Chicago, Ill., this battery of Revere-equipped exchangers produces 1,000,000 gallons per day of higher purity water than most municipalities supply.

W. L. BADGER ASSOCIATES, INC., Ann Arbor, Michigan, conceived, developed and designed the process and were the Architect-Engineers.

tion of briny water, 250 degree temperature and pressure was encountered, *Revere Welded Steel Tube* was recommended. Over 15 miles of it, in fact, in the 12-effect evaporator. But since this was to be a "demonstration" plant, additional Revere Alloys were recommended for test purposes . . . Admiralty, Aluminum Brass and 90/10 Cupro Nickel. Altogether, this Conversion Plant used an amazing 124 tons of Revere Tube!

Why not have the Revere Technical Advisory Service work with you in solving *your* specific problem . . . simply by calling the Revere Office nearest you?



## REVERE

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Check 2190 opposite last page.

## PROCESSING EQUIPMENT

**Only minutes needed to replace bags in collector**

**Uses:** Removing dirt from air and gas streams.

**Features:** Worn collector bags may be removed individually from outside of unit in a matter of minutes.

**Description:** Compact dust collectors are available in three standard models with 18 different capacities. Filter



Dust collector, shown with horizontally-mounted bags, requires only minimum headroom

areas vary from 6.8 to 368.4 sq ft. Cloth loadings range from 5 to 15 cfm/sq ft.

Each filter bag is mounted in its own "sock-cage". Light weight castings are an integral part of each bag frame. Collectors are available with either horizontally- or vertically-mounted bags. There are no internal moving parts. A wide variety of bag materials may be specified.

(Uni-cage filter-collectors are product of Young Machinery Company, Inc., Muncy, Pa.)

Check 2191 opposite last page.

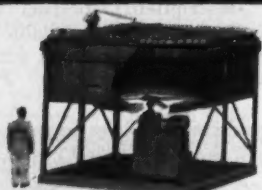


"Hmm! 92c late!"

# Young

**BUILDS THE BEST  
HEAT TRANSFER  
PRODUCTS . . .**

**FOR THE CHEMICAL AND  
PETROLEUM INDUSTRIES**



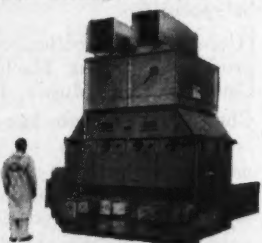
## HC® AIR COOLED COOLERS AND CONDENSERS

In 14 basic sizes, either as single or multiple units, for handling large capacity cooling requirements for gases, oil and water, process fluids, and condensing steam and vapors. Catalog No. 557.



## HEAT EXCHANGERS

Young offers a complete line of shell and tube fixed and removable type Heat Exchangers, for cooling jacket water, lube oil, gases and process fluids. All stainless steel construction available in fixed bundle arrangement. Many sizes from stock. Fixed tube bundle Catalog No. 1261. Removable tube bundle Catalog No. 1160.



## EVAPORATIVE COOLERS AND CONDENSERS

Available in 8 models, with single, two or four coil assemblies. Engineered for cooling jacket water, lubricating oil, hydrocarbon gases, condensing steam or other vapors. Catalog No. 1959.

Write to Dept. M-371  
for Catalog required

**YOUNG RADIATOR COMPANY**  
**RACINE, WISCONSIN**

Plants at Racine, Wis. and Maitland, Ill.

## PROCESSING EQUIPMENT

**Wet collector costs  
vary with efficiency,  
can be \$0.60/(cfm) (yr)**

The total cost (purchase price, installation and operating costs) dust removal by wet collectors can be correlated with the required collection efficiency. The exception is that mechanical scrubbers have greater costs relative to efficiency than other types.

In table below, total costs are given for treatment of 60,000 cfm of 68°F gas carrying 5 grains/cu ft of minus 150-micron silica, 30% minus ten micron.

Collector	% Eff	Cost/ (yr) (cfm)
1) Inertial orifice scrubber	93.5	\$0.153
2) Spray tower	96.3	0.245
3) Impingement baffle scrubber	97.9	0.286
4) Mechanical scrubber	98.5	1.02
5) Venturi scrubber	99.7	0.60

Typical depreciation charges for these scrubbers, assuming a 10 year life are 1) \$2950; 2) \$6200; 3) \$3500; 4) \$8000; 5) \$5100. In general, installed costs for chamber scrubbers are less than for cyclonic scrubbers for capacities under 15,000 cfm. Inertial scrubbers probably cost more than cyclonic scrubbers, but all approach each other in the range of 30,000 to 50,000 cfm.

Wet scrubbers are approximately competitive with bag filters as moderate-cost, high-efficiency, dust collectors.

## Use Criteria

Wet collector use is indicated when: 1) addition of liquid to gas stream is not objectionable; 2) the particulate matter is between 0.1 and ten-microns particle diameter; 3) moderately high collection efficiency is desired; 4) the gas must be cooled; 5) vapors or gaseous contaminants must also be removed.

Wet collector application presents problems when: 1)

soluble particulates recovered must be recrystallized and may become contaminated with the scrubbing liquor; 2) collector requires means of disposal for objectionable sludge; 3) recovery of insoluble products requires a dewatering step; 4) moderately high removal efficiencies are required for particles under one-micron diameter; 5) scrubbing liquor becomes corrosive; 6) liquid entrainment in effluent gas represents source of contamination; 7) the collector might freeze in cold weather.

(Based on data taken from paper "Cost of Wet Scrubbing of Gases," presented by Nathan Gilbert, U. of Cincinnati, at AIChE annual meeting, Washington, D.C.)

(Paper is part of series to be available from American Petroleum Institute, 1271 Avenue of the Americas, New York 20, N. Y.)

## Manufacturer adds polypropylene tubes to filter line

Polypropylene filter tubes for cartridge-type filters have been added to manufacturer's line of windings and cores.

The units consist of precision-wound polypropylene fibers on a rigid, polypropylene or other chemical-resistant perforated center core. Filtrate passes through the fiber winding to the core. Filtration is accomplished by the sieve-like pattern of the winding, and by the contaminant-absorbing characteristic of the fiber itself.

The winding pattern presents declining passages to the flowing filtrate, which results in removal of progressively smaller particles as filtrate flows towards the core. Particle selectivity — from 100 microns to one micron is provided by choice of winding densities.

(Further information about polypropylene filter tubes may be obtained from Filterite Corporation, Timonium, Md.)

Check 2193 opposite last page.

Don't let  
these Devils  
INTERFERE with  
OPERATING  
PERFORMANCE



Troublesome maintenance and lubricating problems are eliminated when you specify Thomas "All-Metal" Flexible Couplings to protect your equipment and extend the life of your machines.

Like a thief in the night an inadequate coupling causes wear and damage to your machines — resulting in high maintenance costs and costly shut-downs.

**NO MAINTENANCE**  
**NO LUBRICATION**  
**NO WEARING PARTS**  
**NO BACKLASH**

**UNDER LOAD and MISALIGNMENT**  
**only THOMAS FLEXIBLE COUPLINGS**  
**offer all these advantages:**

- ▶ Freedom from Backlash
- ▶ Torsional Rigidity
- ▶ Free End Float
- ▶ Smooth Continuous Drive with Constant Rotational Velocity
- ▶ Visual Inspection While in Operation
- ▶ Original Balance for Life
- ▶ Unaffected by High or Low Temperatures
- ▶ No Lubrication
- ▶ No Wearing Parts
- ▶ No Maintenance

Write for our New  
Engineering Catalog 60

**THOMAS FLEXIBLE  
COUPLING CO.**

WARREN, PENNSYLVANIA, U.S.A.

Check 2194 opposite last page.

CHEMICAL PROCESSING

Check 2192 opposite last page.

## PROCESSING EQUIPMENT

### Ceramic fiber blanket traps costly catalyst from 1100°F gases

Used in conjunction with HNO<sub>3</sub> reactor

Platinum-rhodium, an expensive catalyst used in nitric acid production, is effectively being recovered by a ceramic fiber filter at 1100°F. The catalyst is removed directly from the acid gas stream leaving the reactor operating at about 1380°F.

The ceramic fiber blanket used as the filter is made from fine diameter (average seven microns) or medium diameter (average 10 microns) fibers. The fibers are inert to most chemicals and withstand temperatures up to 2300°F. They also have low thermal conductivity.

(Further information about Fiberfrax XLF and XLM blankets may be obtained from Ceramic Fiber Project of The Carborundum Company, 1959 Buffalo TR, Niagara Falls, New York.)

Check 2195 opposite last page.

### NEW LITERATURE

#### Processing Equipment

**Fluid-bed unit** for rapidly drying granular materials is described in 12-page brochure. Operation, construction and fields of application are cited. Technical data are included. The dryer is of Swiss design. Cabinet style housing may be heated by steam or electricity. Bul "Aeromatic Dryer" — The Fitzpatco Co.

Check 2196 opposite last page.

**Automatic, gravity-type water filter**, having single control valve, is discussed in six-page bulletin. Unit stores its own backwash water. Standard fine sand is used as filter medium. Bul WC-130—Graver Water Conditioning Co.

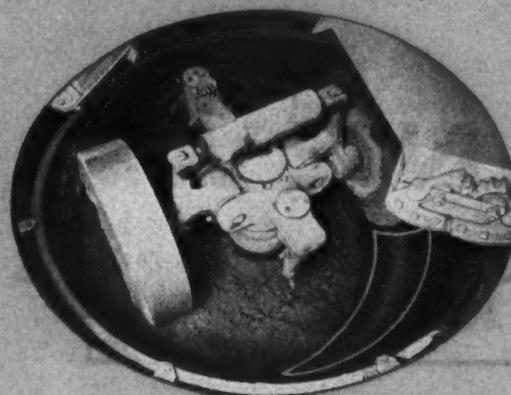
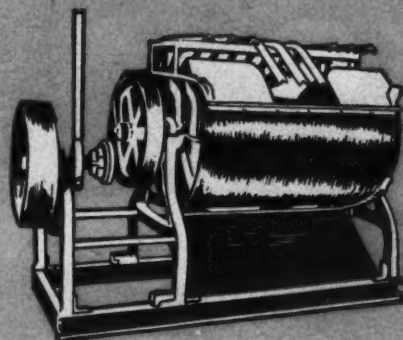
Check 2197 opposite last page.

**Electrically-heated processing equipment** is subject of 20-page catalog. Discussed are tanks, pipe, valves and other units. Sta-Warm cat—Sta-Warm Electric Co.

Check 2198 opposite last page.

# MIX-MULLER

## MEANS CONTROLLED DISPERSION



You can MIX without a muller; but can you MULL without mullers?

### A study in semantics . . .

The muller is a very specialized piece of mixing equipment. It is specifically designed for use where an intensive, intimate blend of dry/solid, solid/solid, or wetted/solid materials is needed.

Trying to mull, or achieve controlled dispersion, in a machine not equipped with MULLER WHEELS is like flying a tailless kite on a windy day . . . you may get it off the ground, but you have no control.

The fact that you can control dispersion through the use of muller wheels is the reason why at least three manufacturers have specialized in this art for about half a century. Today, the need for controlled dispersion has become increasingly evident to processors as well as to mixer manufacturers . . . everybody's got a muller. So, if you need controlled

dispersion, it will pay you to remember that *mulling* is more than a matter of semantics. What was a *mixer* last year . . . is not necessarily a *muller* this year.

Simpson Mix-Muller Division has devoted a 12-page bulletin to the subject. It's called the **HANDBOOK ON MULLING**. Why not write for a copy? Or, see it in the current *Chemical Engineering Catalog*.

Presented in the interests of maintaining truthful presentation of—and purposeful application for, the mulling principle of mixing by:

**SIMPSON MIX-MULLER DIVISION**

NATIONAL ENGINEERING COMPANY

640 Machinery Hall Bldg. • Chicago, Illinois



P-1500-R

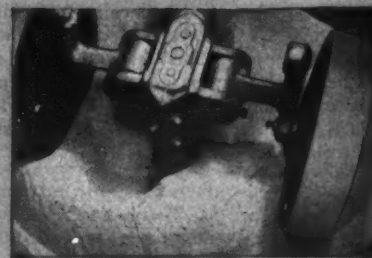
## NOTHING MULLS LIKE A MULLER



**GOING:** Mix is wetted, dispersion of coating media begins as lumps begin to form.

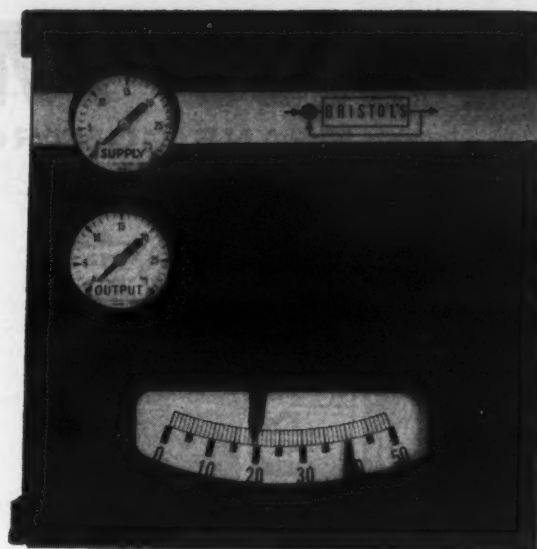


**GOING:** Smearing, spatulate action breaks up lumps as mulling action disperses moisture.



**ONE:** Agglomerates almost gone as blending nears completion. Mix is homogeneous, thorough.

Check 2199 opposite last page.



## Series 624 A/D\* pneumatic controller features simplicity and high control stability

- Simple modular design for ease of servicing
- High control stability for closer process control
- Designed for batch-type and continuous processes
- Proportional and proportional-plus-reset control models available

Top control performance with maximum simplicity plus standard Bristol precision measuring elements—those are the key features of the Bristol Series 624 Controller. The 624 uses the same renowned elements that have earned such a reputation for accuracy and dependability on other Bristol automatic controlling and recording instruments—perfected through wide experience and many years of development.

Self-contained modular design of the control unit speeds servicing. The whole modular unit, consisting of an aluminum casting with working parts made of stainless steel, Ni-Span C, and Neoprene diaphragms, can be removed by taking out only two screws and a link.

Outstandingly compact, the aluminum instrument case (only 8" x 8" x 5" overall) is completely weatherproof. It is designed for either flush, surface, panel, or valve mounting. Attachments for pipe mounting (2-inch pipe) are available. Write for complete data on the versatile and economical 624 A/D. The Bristol Company, 141 Bristol Road, 0.35 Waterbury 20, Conn.

\*Advanced Design

**BRISTOL**... for improved production through measurement and control  
AUTOMATIC CONTROLLING, RECORDING AND TELEMETERING INSTRUMENTS

### CONTROLLERS OFFERED FOR:

**PRESSURE AND VACUUM:** Ranges from full vacuum to 10,000 psi.

**TEMPERATURE:** Ranges from -100°F to +1000°F.

**FLOW AND DIFFERENTIAL PRESSURE:** With mercury-type manometer and dry-type differential unit.

**LIQUID LEVEL:** With bulb unit and mercury manometer and dry-type differential unit.

**HUMIDITY:** Zero to 100% relative humidity.

### CONTROL UNIT CHARACTERISTICS:

**PROPORTIONAL BAND:** 0-400% continuously adjustable, direct- or reverse-acting.

**RESET:** 0.1 to 50 repeats per minute.

**AIR PILOT:** Non-bleed type.

**PILOT CAPACITY:** 3.0 scfm.

**FREQUENCY RESPONSE:** Flat to 300 cycles per minute.

**TEMPERATURE STABILITY:** Less than 0.25% change in the output pressure for 90°F temperature change.

**MATERIAL:** Aluminum housing; 316 stainless steel internal parts; Ni-Span C feedback element.

## PROCESSING EQUIPMENT

**Heat-transfer units**, called Platecoil exchangers, are discussed in 68-page technical brochure. Case history information is given on installations involving cryogenics, heating, cooling and other applications in specific plants. Bul 159 — Platecoil Division of Tranter Manufacturing, Inc.

Check 2201 opposite last page.

**How vacuum stills** permit reclaiming solvents at cost of about 1¢ per gallon is told in four-page bulletin. Construction features and specifications of the equipment are included. Bul FB-101—Filtration Division, Hoffman Industries, Inc.

Check 2202 opposite last page.

**Operation of flooded-plate scrubber** for removing fumes, mists and other particulate matter is reviewed in four-page bulletin. Capacities are 500 to 10,000 cfm. Bul 170—Air Pollution Control Division, John Wood Company.

Check 2203 opposite last page.

**Heat exchanger** bulletin of 16 pages, contains sizing information, dimensions and selection chart that indicates lowest-cost U-tube unit for a desired capacity. Bul EUT-161—Killebrew Engineering Corporation.

Check 2204 opposite last page.

**Sewage treatment plants** are summarized in 12-page brochure. Units are designed for use where municipal sewage treatment is unavailable or where the cost of connecting to an existing system is excessive. Bul 7330 — Dorr-Oliver Incorporated.

Check 2205 opposite last page.

**Crusher for fine reduction** of wet and sticky clays or shale is topic of six-page bulletin. Weight, dimensions and materials of construction are listed. Bul 6020 — Pennsylvania Crusher Division, Bath Iron Works Corporation.

Check 2206 opposite last page.

**Self-cleaning centrifuges** are described in eight-page, four-color catalog. Illustrations and specifications are shown for models with capacities ranging from 200 to 6000 gph. Bul "PX Series Centrifuges"—De Laval Separator Co.

Check 2207 opposite last page.

**Synthetic fiber felts** — polypropylene, Teflon, dacron and others — are described in detail in eight-page technical bulletin. Tables list general, physical, chemical and mechanical properties. Bul 4-61 — American Felt Company.

Check 2208 opposite last page.

Check 2200 opposite last page.

*Fourdrinier machine foreman re-sets controller for new viscosity level as operator points to band of individual swings, each swing representing time of one viscosity measurement*



## Automatic viscosity control improves paper-coating operation

**Labor saved, waste reduced, more uniform coatings result as two-minute instrument cycle replaces 30-minute operator check**

By **ROGER THOMPSON**,  
Process Engineer  
KVP-Sutherland Paper Co.,  
Kalamazoo, Michigan  
With **CP STAFF**

### A NEW SOLUTIONS FEATURE

**Problem:** Manual control of viscosity of paper-coating suspensions took almost the full time of one operator at KVP-Sutherland Paper Company, Kalamazoo, Michigan. Manual control also necessitated some waste of coating material (large or small, depending on attention paid by operator) to assure that no paper would get less than a needed minimum coating thickness.

Paper stock was coated with clay in a starch or a casein binder by brief contact with liquid suspension when passed over the coating rolls of a Fourdrinier machine.

Operators controlled liquid

viscosity and coating thickness by adding water to a surge tank through which the coating suspension circulated. A sample was taken every half-hour and viscosity was adjusted. Then the water valve was set so that the amount of water added was less than the water lost. Liquid viscosity was allowed to climb until the next semi-hourly adjustment. High average viscosity and over-deposition of solids resulted.

**Solution:** An automatic viscosimeter and recording controller were installed. The viscosimeter was chosen because it correlated with Ford-cup viscosity checks and because its measurements had

an inherent high repeatability.

The viscosimeter measures by raising a submerged piston in a cylinder by motor, thus bringing liquid into the cylinder. The piston is allowed to fall by gravity and force liquid out through orifices. The time required for piston fall is the measure of viscosity.

While the piston falls, an electrical signal is given out, and a pen swings away from the center on a round-chart controller. If the pen swings past the preset point, too-high viscosity is indicated, and a switch opens a solenoid valve on the water line to reduce viscosity.

**Results:** The operator who formerly controlled viscosity

# DUPLICATE BATCHING OPERATIONS



## WITH THE NEW NIAGARA ELECTRIVOLUME METER

Brings automation to liquid processing. Set the pointer to the quantity of liquid desired and push the button. The meter takes over from there. It automatically measures and delivers the preset quantity, when the flow has stopped it resets the quantity, ready to duplicate the delivery cycle when the starting button is again pressed. It's as simple as that!

To change the quantity for a new formula, just turn the pointer to the gallonage called for and the meter is ready. Should an emergency arise, a stop switch is provided to shut off the flow at any point in the delivery cycle.

The Niagara Electrivolume Meter can be used to start or stop pumps, operate solenoid valves, signalling devices, electric relays and other processing equipment to make the meter the master control center for a complete series of operations. It can be used to actuate other Electrivotume Meters to automatically deliver other liquids in any desired sequence. There is virtually no limit to the extent which the Electrivotume Meter can be used to initiate and control process cycles.

If you formulate liquid components, the Electrivotume Meter will assure complete uniformity of product at lower costs. Write for complete information.

## BUFFALO METER COMPANY, INC.

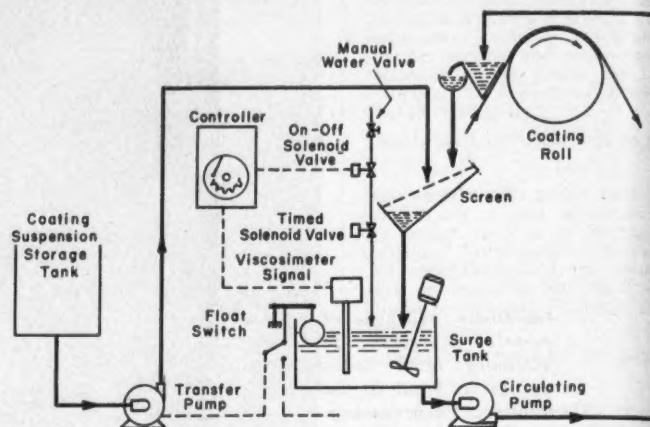
Subsidiary of American Meter Company

2892 MAIN STREET • BUFFALO 14, N.Y.

Sales representatives throughout the nation

Check 2209 opposite last page.

## AUTOMATIC VISCOSITY CONTROL



### How KVP Controls Viscosity

KVP coats high-quality paper directly on the Fourdrinier machine. Various coatings are used for different grades of paper. Liquid coating suspensions must have controlled viscosity to deposit the proper amount of coating clay on the printing-quality paper stock.

Suspension is made up with less water than necessary and is stored with No. 4 Ford-cup viscosity 2-3 sec greater than required. Suspension is pumped from storage to surge tank to replace coating applied to rolls. Coating make-up is controlled by the surge-tank float-switch which operates the transfer pump.

Suspension is adjusted to the proper viscosity in the surge tank. Then it is pumped to the coating rolls and picked up by the paper stock. Various stocks pick up more water than solids, and some quantity of coating suspension is recycled to maintain viscosity.

Excess liquid overflows the applicator device and returns to the surge tank to be reconstituted. Recycle from the coating rolls and the make-up from the storage tank are passed over a vibrating screen to remove paper scraps and lumps formed in storage before mixing in the surge tank.

Viscosity is controlled by viscos-

imeter and controller-recorder with solenoid valves in the water line. Viscosimeter takes a reading every two minutes. If the viscosity is too high, the on-off solenoid valve opens and water is let into the surge tank.

The control cycle is set so that measurement is taken within 15 seconds. If the viscosity is high, the on-off valve opens. The timed solenoid opens for 75 seconds. Then 30 seconds are allowed for mixing. At the end of the two-minute cycle, the on-off valve closes and the cycle repeats. The timed solenoid and the viscosimeter are on the same two-minute cycle.

Water flow rate is set manually by the bulk-preparation operator in accordance with orders from the Fourdrinier foreman. This is judged by the trend of viscosimeter discharge times, shown by the round-chart controller. The water rate is set so that the on-off solenoid opens about every other cycle.

The Fourdrinier foreman also changes the setpoint on the controller to maintain the proper viscosity each time the paper stock or the coating suspension is changed. Slurry viscosity is checked out with the Ford-cup and the controller is adjusted.

has been freed for other duties. The 30-minute cycle has been reduced to two minutes. This has resulted in much lower average viscosity, reducing waste from over-deposition and improving quality control.

No routine cleaning or maintenance has been found necessary.

(Viscosimeter is a product of Norcross Corp., 247 Newtonville Ave., Newton 58, Mass.)

Check 2210 opposite last page.

CHEMICAL PROCESSING

**Solids moisture analyzer**  
is automatic, accurate,  
specific to water

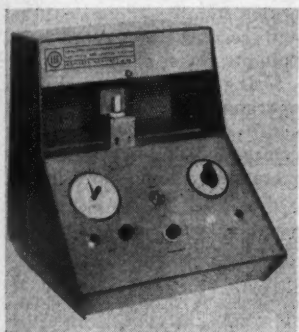
**Uses:** To determine moisture analysis in solids.

**Features:** Instrument is specific to water. Keidel electrolytic-cell principle is used to measure moisture in solid samples, with a reported accuracy of  $\pm 2\%$ .

**Description:** A weighed solid sample is placed in a five-cc oven, heated by an RF field. Moisture escaping is picked up by a carrier gas flowing about 100 cc per minute. The average test cycle is 10 minutes. The mass flow rate of the water is represented linearly by a Keidel electrolytic-cell current.

A highly accurate electro-mechanical integrating motor provides a direct readout in micrograms of water.

The manufacturer states the



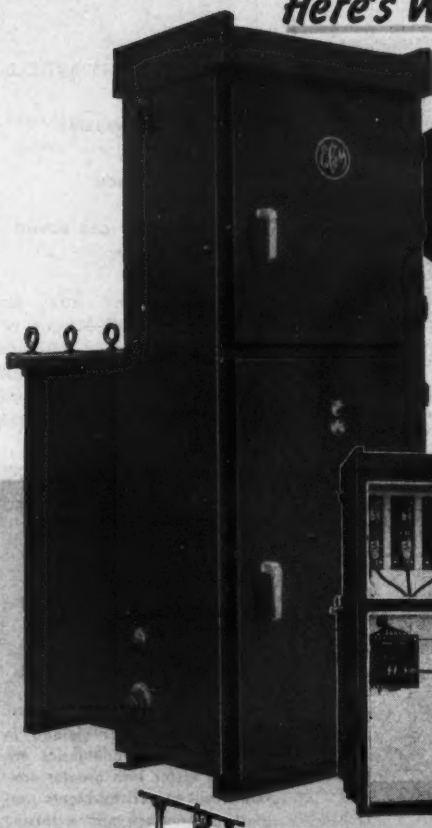
Automatic moisture analyzer is 14" wide, 16" high, 12" deep

instrument is an improvement over instruments that operate on the weight-loss principle. It measures water only. It is accurate to  $\pm 5$  micrograms or 2% of final reading, whichever is larger, down to 10 micrograms. Sensitivity is 0.1 microgram of  $H_2O$  per division of the integrator dial. Dynamic range is 0.1 microgram to 1.0 milligram per complete cycle of the integrator.

(Type 26-320 automatic solids moisture analyzer is a product of Analytical and Control Division, Consolidated Electrodynamics Corporation, subsidiary of Bell and Howell, 360 Sierra Madre Villa, Pasadena, California.)

Check 2211 opposite last page.

*Here's Why CHEMICAL MEN specify...*



## EC&M OIL-BREAK STARTERS (2200-4800 VOLTS)

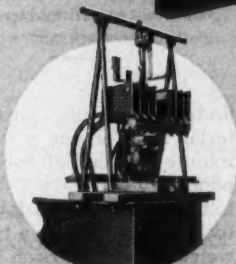
**—THEY'RE Specifically Designed  
FOR DUSTY, CORROSIVE ATMOSPHERES**

EC&M Type ZHS Starters are a "natural" for chemical plant service because the high interrupting capacity ZHS contactor operates under oil. Being totally oil-immersed, this contactor is always well lubricated, protected from corrosion and requires infrequent inspection. There are additional advantages—

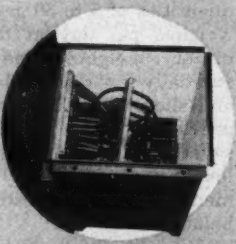
**QUICKLY INSTALLED** because starters are shipped with all internal wiring complete. These ready-to-use starters cut installation time and cost.

**HIGH INTERRUPTING CAPACITY** • These EC&M Starters are available in enclosures for indoor or outdoor mounting, and are supplied in 3 ratings—(1) 50,000 KVA (certified) interrupting capacity (inherent in the starter)—(2) with power-type, current-limiting fuses—(3) VALIMITOR® (volt-ampere-limiter), the bus may be of unlimited KVA.

Exterior and interior views of EC&M Type ZHS High Voltage Starter in NEMA 3R (raintight) enclosure with threaded connections for conduit



With EC&M contactor-lifter, contactor is easily raised above oil level for easy inspection without disconnecting any bolts or leads



Down-view into oil tank. Note compactness of contactor and transformer assembly. All leads are anti-siphon



An installation of two EC&M 2300 volt, reversing dynamic braking starters in a large rubber plant

For the complete story, write for Bulletin 8130



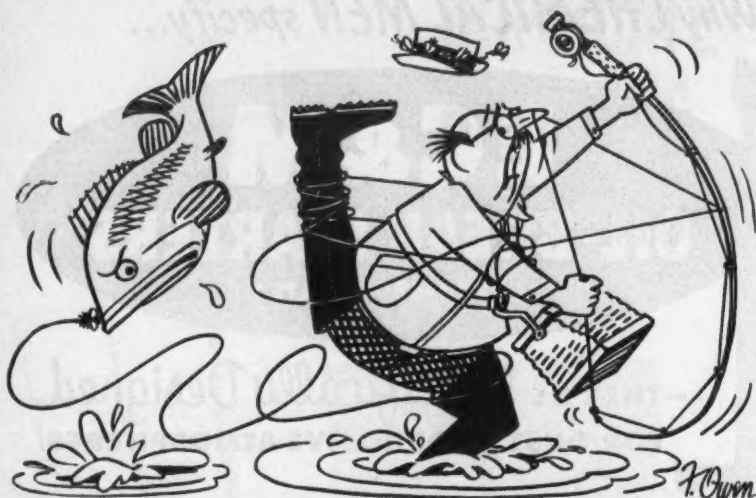
### SQUARE D COMPANY

EC&M DIVISION • CLEVELAND 28 OHIO

wherever electricity is distributed and controlled

9179

Check 2212 opposite last page.



## THERE'S A RIGHT WAY TO HANDLE $H_2O_2$ , TOO!

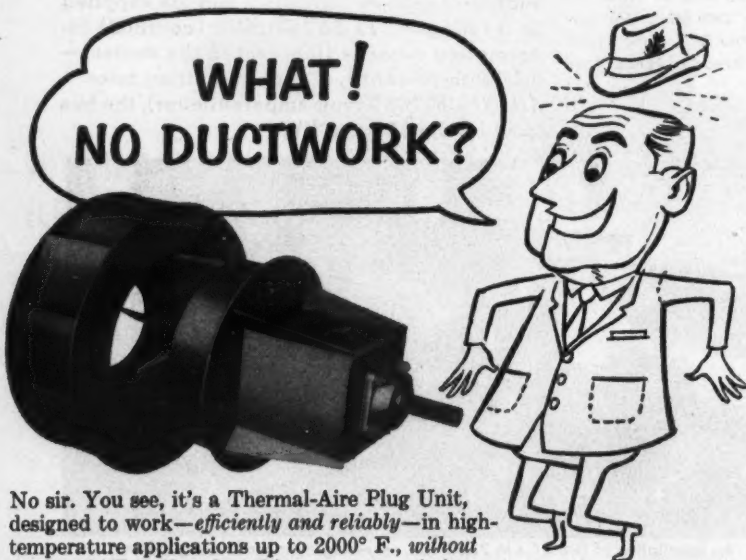


**Becco  
Chemical  
Division**

161 East 42nd Street, New York City

Becco engineers are specialists in Hydrogen Peroxide...and in the best ways of handling it. Let us put our fourfold service—offering survey, proposal, installation and inspection—to work for you now. It's your assurance of savings, safety and convenience.

Check 2213 opposite last page.



No sir. You see, it's a Thermal-Aire Plug Unit, designed to work—efficiently and reliably—in high-temperature applications up to 2000° F., without duct work! Equally adaptable to new or existing furnaces, ovens, kilns, etc., Thermal-Aire Plug Units are quickly and easily installed. Provision of a hole in furnace wall to receive the fan wheel is the only requirement. Then simply bolt the unit in place for dependable, low-cost air circulation... matched to your job requirements.

■ Write today for Bulletin 960

## THERMAL-AIRE PLUG UNITS

Garden City Fan & Blower Co. 803 N. Eighth St. Niles, Michigan

Check 2214 opposite last page.

## INSTRUMENTS & LAB

### ▶ A NEW SOLUTIONS ARTICLE

#### Search for analgesics speeded by use of torsion balance

Time and labor are saved at Bristol-Myers

The search for new analgesics at Bristol-Myers research laboratory in Hillside, N.J., entails repeated weighings of synthetic-organic compounds. Success depends upon



Organic compounds yielded in synthesis of new analgesics are weighed faster with greater convenience at Bristol-Myers research laboratory with a torsion balance

finding medically active material from among a virtually infinite number of such compounds.

To save time and labor, lab technicians now use a two-dial weight-loading torsion balance which yields readings more quickly than did the prior system.

Thirty or more sample quantities of 5 to 50 grams are weighed per day at the laboratory. Weighing time is substantially less than with beam-and-slide-weight balances previously used. Biggest time savers are the dials used to load weight and finer adjustments without arresting the balance.

For example, typical weighing operation at the laboratory would involve yield of an organic synthesis of roughly 47.7 g. Flask and flask holder weigh 100 g. Placing a 100-g weight in the right pan, weight-loading dial can be turned up in one motion immediately from 0 to 50 g without arresting and before the pointer swings over.

This dial is returned to 40 g by a simple twist. Fine

weighing is dialed in to 7.7 g, again continuously and without arresting balance. Pointer swings are damped-down rapidly by a silicone-fluid dash pot. The 500-g capacity torsion balance used in this lab is accurate to 50 mg.

(Torsion balance DWL-5 is product of The Torsion Balance Company, Clifton, New Jersey.)

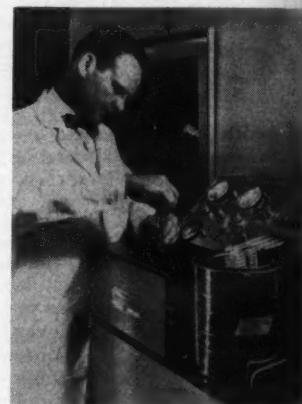
Check 2215 opposite last page.

#### Organic-mix components part ways quickly with chromatograph

To prepare pure organics: inject sample; collect

The dimension of volume has been added to analysis by gas chromatography with the development of a preparative gas chromatograph which separates samples of up to 10 ml and recovers separated components for further study.

Using the chromatograph, an operator studying complex organic mixtures can separate components quickly and completely without conventional



Special needle is mounted permanently in preparative gas chromatograph. Operator simply attaches filled syringe, injects sample, and collects components in chilled traps (in Dewar flask, right)

analytical distillation. Recovery is 85 to 95%.

Operator usually begins by running small test sample through to get a chromatogram that shows when each com-

ponent will leave system. Thereafter, when peak for given compound is due to appear on recorder, he can open one of the collecting valves and close the vent to divert that "cut" into one of the chilled traps.

When peak has passed, he re-opens vent to close sample valve. That component will be safely in the trap. The chromatograph is housed in 19 x 22 x 51" cabinet and sells for \$2750.00.

(Prep/Partitioner is product of Fisher Scientific Co., 303 Fisher Bldg., Pittsburgh 19, Pennsylvania.)

Check 2216 opposite last page.

#### Low flows won't wander under regulator's guide

**Uses:** Regulation of flow rates in 0.1 to 5.0-gpm range.

**Features:** Regulator automatically holds flow rates constant regardless of line-pressure variations.

**Description:** Flow-rate regulator incorporates piston-and-spring operation precluding diaphragms and pressure connections. It can be installed in any position without straight-pipe runs either up or down stream. Half turn on adjusting screw sets the flow rate to within accuracy of  $\pm 5\%$  of set point.

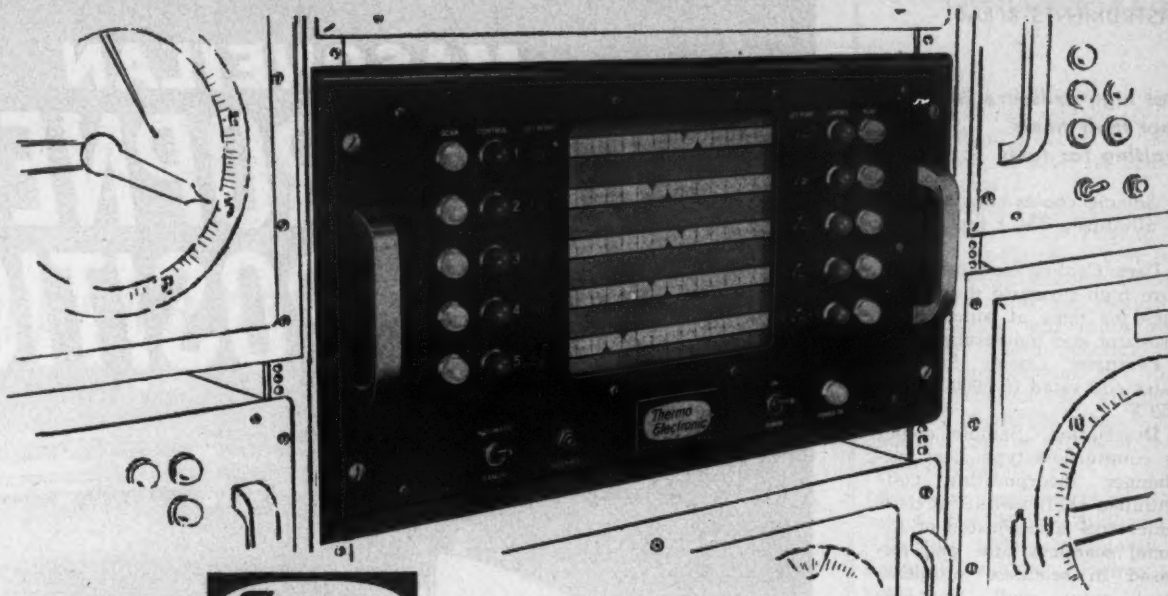
Unit is made of 18-8 stainless steel, is built to withstand internal pressures to 1000 psig, operates a nine psig or less, and has max inlet-to-outlet pressure drop of 125 psig.

(Fix-A-Flow regulator is product of The W. A. Kates Co., 430 Waukegan Rd., Deerfield, Illinois.)

Check 2217 opposite last page.

#### NEXT MONTH

Continuous process-stream analysis by means of X-ray emission is the latest tool to come of age in the fast-growing process-analyzer field. Present application areas and future possibilities are discussed in these pages next month.



## ONE Multi-Point Controller Controls TEN Process Temperatures

One, compact "Thermo Electronic" Multi-Point Controller gives you, sensitive, accurate, automatic...

- Two position (off-on) control of up to ten separate process temperatures; also controls flow, pressure, pH, Strain gages, and other operations.
- Three position control of five separate processes!
- Single point constant control of any critical process!
- Manual-Balance Indication of exact process conditions!
- Monitoring of extra points or those already under control!

#### Ten In One

One instrument does the job of ten individual controllers. You save—40 to 60% of initial cost—up to 75% of panel space—cut installation time and cost—minimize maintenance!

#### Clean, Simple, Functional Design

The "Thermo Electronic" Multi-Point Controller has front-set controls for easy operation. Routine maintenance is also done from the front, without removing unit from panel or relay rack. Available in either potentiometer or bridge measuring circuits, with an extremely stable constant voltage supply, the instrument provides long-lived, trouble-free control of practically every process suitable to off-on control action. Sensitivity is 15 microvolts independent of scale span—Accuracy is  $\pm 0.5\%$  of scale span.

#### Operation

Sensing element input signals are compared, in sequence, to individually adjustable slide-wire set-points. Signal deviations are amplified by the "Thermo Electronic" high-gain relay control amplifier, and used to actuate load relays connected to the points being controlled.

Scanning sequence is governed by a stepping switch and electronic timer. Scanning rate—3 seconds per point. Other scanning speeds are available by simply changing one carbon resistor.

Ten white lights on the instrument panel show scanning position—ten red lights show process condition. Ten knobs permit adjustment of individual set-points on the range scales. Ranges are available for thermocouples, resistance temperature detectors and other types of suitable transducers.

#### Maintenance is Easy

The instrument slides forward on built-in tracks. Simple adjustment and inspection is easily accomplished from the front. The plug-in or screw-terminal components are easily replaced—fully protected from dirt and corrosive atmosphere. The whole instrument is gasketed to further protect components.

#### Safety Engineering

Critical circuitry is fused against overloading. A failsafe circuit is provided to protect processes against thermocouple burn-out and amplifier component failure.

Write today for Instrument Section 52-5



Temperature  
Measuring Systems  
and Components

20 YEARS

THERMO ELECTRIC Co., Inc., Saddle Brook, New Jersey  
In Canada: THERMO ELECTRIC (Canada) LTD., Brampton, Ont.

Check 2218 opposite last page.

## INSTRUMENTS & LAB

### **Hot high-pressure samples cool their heels waiting for tests**

Sample cooler can tame 6000-psig 750°F liquids

**Uses:** Cooling high-temperature high-pressure fluid samples for tests at atmospheric pressure and temperature.

**Features:** Cooler incorporates coil rated to 6000 psig at 750°F.

**Description:** Sample cooler is counterflow-type heat exchanger incorporating coil-within-a-shell construction. Inner coil is fabricated of Inconel seamless tube and encased in seamless stainless-steel outer shell. Heat-exchange area is one sq ft.

Cooler is available with screwed or 1/4" socket-welding adapter sample connections for convenient adaption to any



Sample cooler is counterflow-type heat exchanger incorporating coil-within-a-shell construction

pipe system. It can be mounted with brackets or "in the pipe."

(Sample cooler is presented in Specification Sheet WC-1001-C—Hagan Chemicals & Controls, Incorporated, Hagan Center, Pittsburgh 30, Pennsylvania.)

Check 2219 opposite last page.

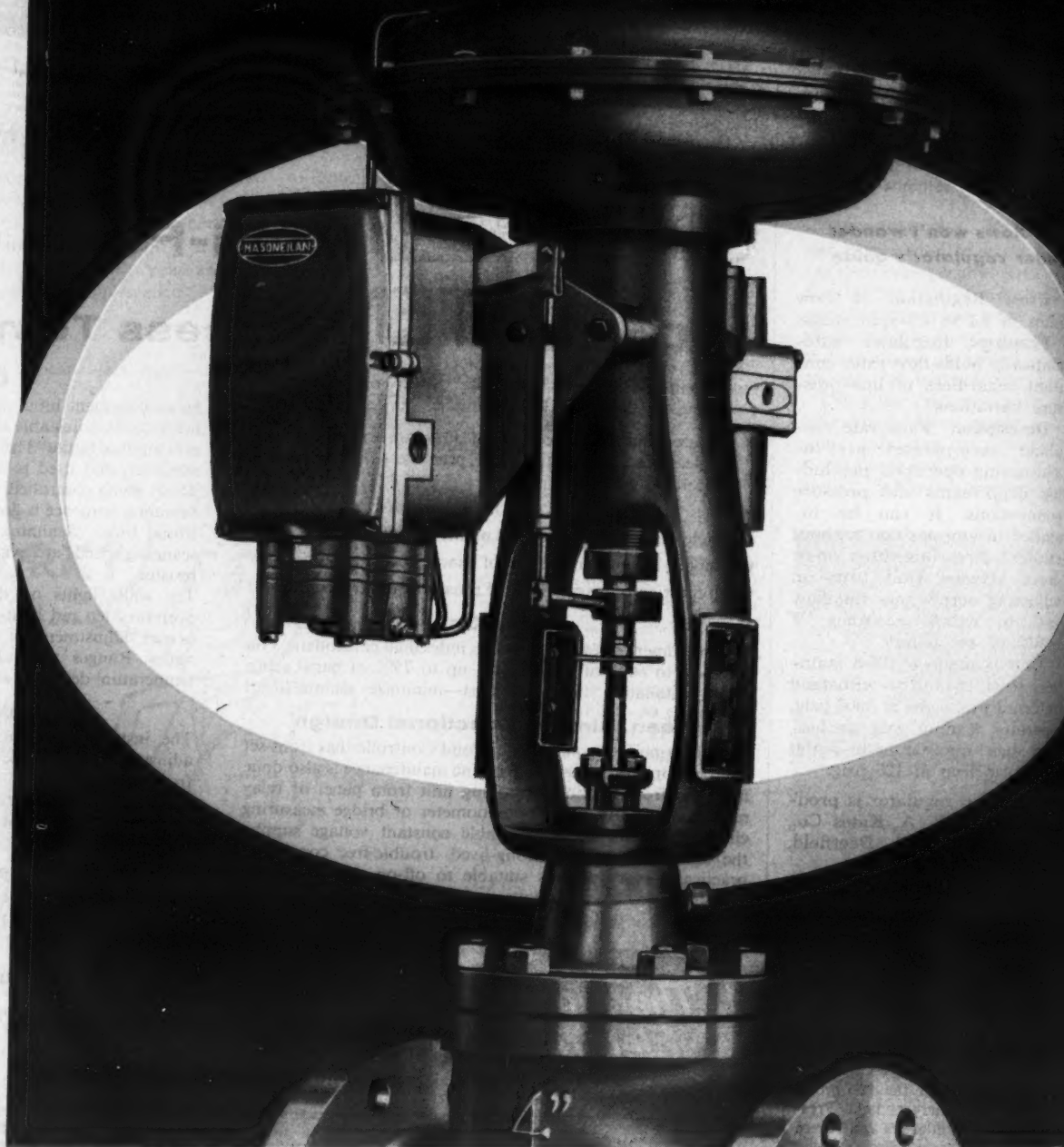
### **Measuring-electrode spin is low-maintenance secret of Cl<sub>2</sub> analyzer**

**Uses:** Continuous measurement and/or control of free or total chlorine residuals in water supplies and sewage effluents.

**Features:** Measuring electrode of analyzer rotates continuously at 1200 rpm. This rotation creates high relative velocity over electrode surface. Signal therefore is not effected by variations in actual sample flow rate.

Rotation also eliminates need for high flow rate of

# MASONEILAN ELECTROPNEUMATIC POSITIONER..



# Arranges Happy Marriage

## Between Electronic Controller and Pneumatic Control Valve

The advantages of the electronic controller can now be mated to the superior power and smooth throttling action of the pneumatic control valve by means of Masoneilan Model 8010 Electropneumatic Positioner — the most advanced device available for converting electric output signal to pneumatic positioner output.

**Fidelity** of positioning is assured because Model 8010 is a true positioner providing *direct* comparison of valve stem position with controller output signal, resulting in dynamic response and accuracy *not possible with any combination of transducer and positioner.*

**Compatibility** with any presently

available electronic controller is obtainable because design provides for adaptability to all usual controller output signals.

**Character** of the design results in high open-loop gain and closed-loop stability. Balanced beam permits installation of the valve in any position without calibration shift.

**You Are Invited** to join the growing number of users who recognize the superior merits of Masoneilan Electropneumatic Positioners. The first step — obtain complete information. Get in touch with any Mason-Neilan office or representative; or write direct to



Products that work for your profit

## MASON-NEILAN

Division of Worthington Corporation

25 Nahatan Street, Norwood, Massachusetts

### DESIGN FEATURES

- Extra large stabilized magnet, plus efficient magnetic circuit, provides high-force changes.
- External stroke adjustment accessible without removal of cover — no exposure of electric wiring.
- High capacity relay for fast stroking speeds. Relay may be mounted in any one of four positions to facilitate piping.
- Balanced beam permits installation of valve in any position without shift in calibration.
- Available for 3-15 psi or 6-30 psi valve spring ranges and for split-ranging. Standard stroke ranges  $\frac{3}{8}$ " - 3" and 2" - 4". Others available.
- Available with direct or reverse action and for direct or reverse actuators.
- Explosion-proof construction meets requirements of Class I, Division I, Group D.

### PERFORMANCE DATA

- Open-loop Gain\* — approx. 100
- Linearity — within  $\pm 1\%$  of full stroke
- Repeatability — within 0.2%
- Load Sensitivity — output pressure change of 1.2 psi per 0.1% of full stroke offset
- Supply Pressure Effect —  $\pm 1\%$  of full stroke for  $\pm 5$  psi change from 20 psi

\*Defined as  $\frac{\% \text{ of full stroke}}{\% \text{ of full input range}}$

Check 2220 opposite last page.

sample and minimizes consumption of reagents. In addition, rotation prevents build-up of foreign matter on electrode surface.

**Description:** In the electrode cell assembly of the residual-chlorine analyzer, sample passes through annular space between concentrically mounted measuring and reference electrodes. These generate a current proportional to the chlorine content of sample. This DC signal is measured, indicated and/or recorded by a potentiometer.

(Anachlor analyzer is product of The Fischer & Porter Company, 929 Jacksonville Road, Warminster, Pennsylvania.)

Check 2221 opposite last page.



Rising flow rings bell

... or other alarm device in flow indicator incorporating an integrally mounted adjustable alarm. Flow indicator-alarm is made of brass for  $\frac{1}{2}$ " pipe connections. Plug rises and falls with changes in flow rate, thus operating a reed-type alarm switch which is adjustable in over-all flow range of 0.05 to 10 gpm. Unit sells for \$50.00.

(Flo-Eye indicator alarm 1885-CDA is product of Dept. MA-5, Instrument Division, Schuette and Koerting Company, Cornwells Heights, Bucks County, Pa.)

Check 2222 opposite last page.



Today, Ohmart can provide nuclear gaging systems which have *four times* the sensitivity of those available just two short years ago! Now —

■ **DENSITY** of solids, liquids, or **PER CENT SOLIDS** of slurries can be measured with a precision and repeatability of  $\pm 2\%$  of full scale or better, with ranges as narrow as 0.025 s.g.u. (4° Be., 5° Tw., 10° API, 5% solids) available.

■ **LEVEL** or **INTERFACE** position of liquids, solids, slurries in tanks can be measured to  $\pm 1/8"$  accuracy over ranges of 50 feet or more.

■ **THICKNESS** or **WEIGHT** of moving webs of sheet materials can be measured with a precision and repeatability of  $\pm 1\%$  of range or better in all cases. (e.g.) Full scale range for measuring thickness of plastic sheet can be as narrow as 0.001", with a precision of  $\pm 0.00001"$ .

## Progress in Nuclear Gaging comes from ohmart

Industry acceptance is another indicator of Ohmart progress. Nearly every process industry — chemical, petroleum, cement, mining, food, paint, plastics, pulp and paper — has Ohmart gaging systems in operation. More than 300 individual U.S. companies are represented among Ohmart gage users, with gage installations numbering in the thousands. Diversity of application is enormous—limited only by the imagination of the user—and ranges from the control of per cent solids in tomato paste, cement, and sewage sludge, to level measurement of coke drums, cupolas, and pulp digesters. Since there are no moving parts, and nothing is in contact with the media, gage maintenance is extremely low.

*Look to Ohmart to improve your process control. Performance to specification is guaranteed! Write for literature.*

—World Leader in Process Control through Nuclear Energy



Engineering representatives in principal areas

**THE OHMART CORPORATION**  
4242 Allendorf Dr., Cincinnati 9, O.

Check 2223 opposite last page.

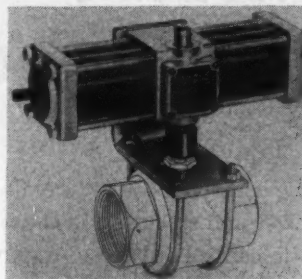
## INSTRUMENTS & LAB

### No favorites are played by pneumatic actuators for 1/4-turn valves

**Uses:** Pneumatic valve actuating.

**Features:** Actuators are adaptable to all ball, plug and butterfly valves operating through 90°.

**Description:** Pneumatic valve actuators can be easily assembled on the spot because bolts and stem adaptor of each



Pneumatic valve actuators can be easily assembled on-the-spot because the bolts and stem adaptor of each are made precisely for the valve in which actuator will be installed

are made precisely for valves on which actuator will be installed. This requires no special tools.

Four models are available in torque ratings of 100, 260, 825 and 2050 in.-lb. Actuators have been field-tested for over 1/4 million cycles at rated torque.

(Pneumatic valve actuators are product of Contromatics Corp., 67 West St., Rockville, Conn.)

Check 2224 opposite last page.

### Water-level reduction throws safety switch to save pump

A switch has been designed to prevent pump damage due to insufficient liquid at source, or when pump loses its prime.

Switch can be used in installations in which bearings, packing glands and motor windings depend on pumped water for lubrication and cooling. Insufficient water flow could damage these parts. The

device senses liquid flow by measurement of discharge pressure, and automatically shuts down system when water level becomes too low.

The switch mounts on pump-discharge line. It is connected with pump-motor power supply. If, after predetermined period of time, pump discharge is not at specified pressure level, microswitch electrically disconnects pump motor, stopping system.

At frequent intervals, automatic cycling of pump will be initiated until required conditions are satisfied by system flow capacity.

(Water-level safety switch is product of United States Gauge Division, American Machine & Metals, Inc., Sellersville, Pa.)

Check 2225 opposite last page.

### Feeble flows controlled by peristaltic pump

Liquids or gases can be handled by a small-capacity peristaltic electronically controlled laboratory pump.

The pump provides a completely variable flow rate from 90 to 500 ml/min. Pumping is accomplished by a gentle, progressive kneading or peristaltic action on a vinyl tube conveying the liquid or gas.

Special wound DC motor is used in connection with controller unit housing DC power supply and transformer assembly to satisfy high-torque requirements of the pump . . . particularly at low speeds. Constant torque of motor shaft is thus maintained over entire speed range.

(Roll-Flex laboratory pump is product of Cole-Parmer Instrument and Equipment Company, 7330 N. Clark St., Chicago 26, Ill.)

Check 2226 opposite last page.

For more information on developments reported in this section, check corresponding numbers on Reader Service Slip opposite last page of this issue.

## NEW LITERATURE

Process Instrumentation  
and Laboratory Apparatus

Measurement, recording and testing instruments are covered in 48-page catalog. Typical product page includes illustration, description, primary specification and product-information reference. Cat G-10b — Industrial Division, Minneapolis-Honeywell Regulator Company.

Check 2227 opposite last page.

Electronic instruments are considered in 32-page catalog incorporating detailed specifications and schematic diagrams. Electrometers, microammeters and auxiliary controls, micro-voltmeters and other instruments are included, along with accessories thereof, in 1961-62 Cat—Keithley Instruments, Inc.

Check 2228 opposite last page.

Sodium-hypochlorite control by oxidation-reduction potential measurement is discussed in a two-page bulletin. Diagrams illustrate control applied to existing batch and continuous processes. Application Data 073.7-2 — The Bristol Company.

Check 2229 opposite last page.

X-ray analytical instrumentation is subject of a 28-page catalog, containing specifications and operating data on X-ray spectrographs, spectrometers, diffractometers, diffraction units and cameras. Analytical Instrumentation Cat—Norelco Instruments, Division of Philips Electronics and Pharmaceutical Industries Corp.

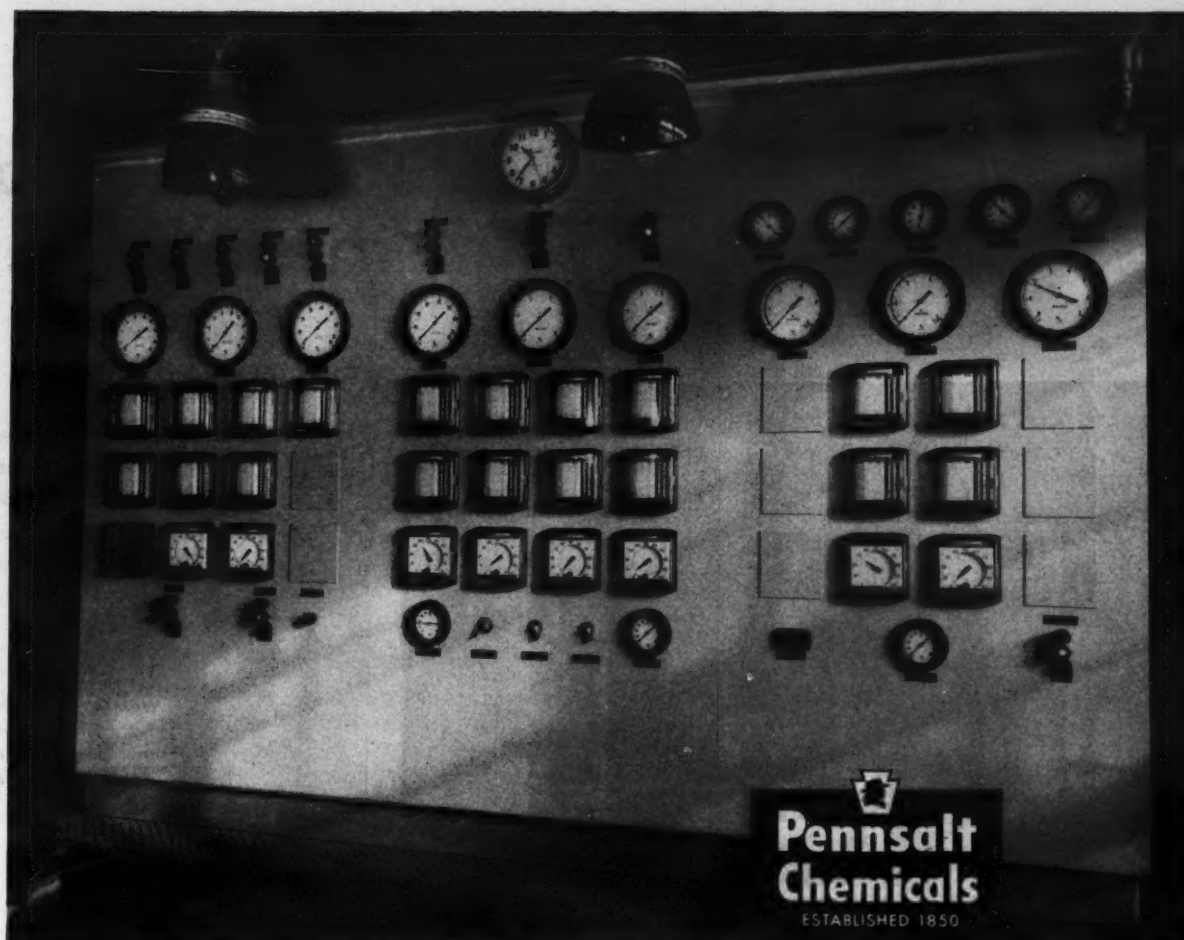
Check 2230 opposite last page.

Generalized control theory is introduced in 12-page manual. Chapters cover block diagram construction, block diagram algebra, mathematical descriptions, frequency response method, oscillation and stability, relative stability and systems response. Booklet describes uses of the analytical approach to control dynamics and serves as a primer for those seeking a general knowledge or those embarking on a study of control theory. Manual TM-8 — Fisher Governor Company.

Check 2231 opposite last page.

Digital data systems for alarm scanning and digital recording of analog values are described in eight-page brochure. Applications and relation of modular design to system costs are discussed. Many standard building blocks and sub-assemblies are illustrated. Systems Brochure 7000 — Monitor Systems, Inc., subsidiary of Epsco, Inc.

Check 2232 opposite last page.



# AAA CONTROL SYSTEM

Photo above shows Taylor TRANSCOPE Indicators and Recorder-Controllers on a central control panel for Alkyl Alkanol Amines production at Pennsalt Chemical Corp.'s new plant at Wyandotte, Mich.

Alkyl Alkanol Amines produced at Pennsalt Chemicals' new plant in Wyandotte, Michigan are used in the manufacture of local anesthetics, antihistamines, textile lubricants, ion exchange resins, and emulsifiers for wax polishes. To assure the amines produced are of the high quality required for these uses, the new AAA process equipment, recently installed, features TRANSCOPE® Recorder Controllers by Taylor.

The plant, designed and constructed by Catalytic Construction Company, utilizes 21 TRANSCOPE one and two-pen Recorders; 13 TRANSCOPE Indicators; and 23 TRANSCOPE Controllers to record and control flow, pressures and levels.

Taylor's Servo-Powered TRANSCOPE Electronic (700J series) and Pneumatic (90J series) Recorder Controllers convert input signals to records of unprecedented accuracy — 1/2 of 1% with standard instruments; 1/4 of 1% optional. They also give threshold sensitivity of 0.1% of input signal; a pen-mounted, three-month ink supply; and a truly rectilinear chart — no curved time lines.

Ask your Taylor Field Engineer for details on these and many other features of TRANSCOPE servo-operated recorders. Or write for Bulletin 98286 (pneumatic) or 98335 (electronic). Taylor Instrument Companies, Rochester, N. Y., and Toronto, Ontario.

*Taylor Instruments* **MEAN ACCURACY FIRST**

Check 2233 opposite last page.

# GE STRETCHES pump life in silicone process



**Due to leaky seals, conventional pumps handling tricky chlorosilanes lasted only a few weeks in tough corrosive atmosphere. Switch to "canned" sealless pumps has greatly lengthened service life and simultaneously slashed maintenance and repair costs**

**WILLIAM D. BRADLEY**, Project Engineer  
Silicone Products Department  
General Electric Company, Waterford, New York  
with **CP STAFF**

**Problem:** Pumps transferring chlorosilanes used in silicone manufacturing process lasted only six to 12 weeks at General Electric Company, Waterford, New York. The big trouble was seal leakage,

because chlorosilanes are very difficult to contain. The material has a tendency to creep through even the smallest crevice.

Upon contact with moisture in air, chlorosilanes hydrolyze to form HCl and siloxanes — an extremely corrosive environment. Minute leaks caused buildup of siloxanes on pumps' seal faces and the seals quickly deteriorated.

The acidic vapors then proceeded to attack the pumps' exterior metal surfaces as well. Maintenance and repair costs soared — not only for the pumps but for other equipment in the area as well.

Pumps of various designs were tried without success. Numerous packings and seals were tested, including graph-

ite, Teflon, asbestos and metallics. However, none could satisfactorily block the tricky chlorosilanes.

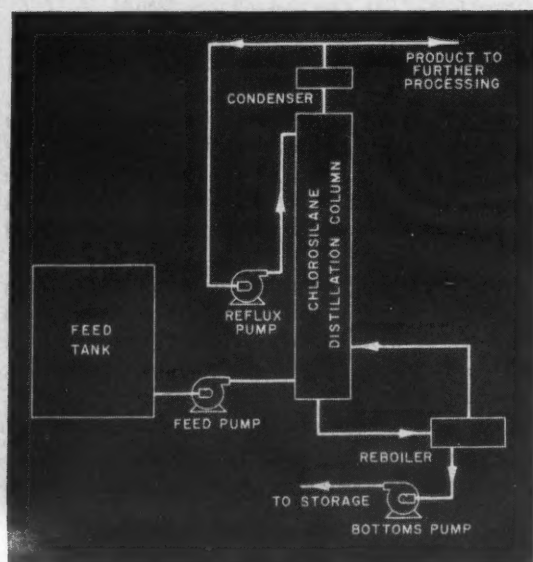
Processing vessels, tanks and distillation units are served by pumps, which are powered by motors ranging in size from one to seven and one-half horsepower. Operations are conducted on both a batch and continuous basis. Temperatures of chlorosilanes being handled vary from 68 to 215°F. Flow rates range from five to 100 gpm.

**Solution:** Experience dictated that a pump having no seals or stuffing boxes was needed. Consequently, a compact, "canned" centrifugal pump was tested. The pump has only one moving part, the rotor-impeller assembly, which is lubricated by the fluid being pumped. No external lubrication is required.

Since most common metals are unaffected by chlorosilane in the absence of air, metal selection for the interior of the pump was no problem. Conventional cast steel was used.

**Canned pump (arrow)** contains no mechanical seals, stuffing boxes, or other shaft-sealing devices, has ended seal-leakage problem permanently

**Simplified flow diagram** illustrates typical use of sealless pumps in chlorosilane-distillation area of GE's silicone manufacturing process





Here is example of corrosion caused by chlorosilane-pump leaks. Although not destructive in absence of air, the chemical hydrolyzes upon contact with moisture in atmosphere to form HCl and siloxanes — an extremely corrosive environment

The first pump failed because the chlorosilanes attacked the synthetic rubber O-rings located between the stator can and the motor windings. This suggested the possibility that a similar pump — but one featuring all-welded construction and with no O-rings might serve the purpose. This was tried and proved to be successful.

Units of this type are also being used in industry today to pump radioactive and other hazardous solutions. Certain models of these pumps can transfer up to 1000 gpm at 5000 psi against a 625-ft head. Operating-temperature range is anywhere between -400° and +1000° F. Pumps perform so quietly that often an indicator light is installed to show that they are running.

The small size of the pump is another advantage. Units require only a fraction of the space needed by conventional pumps having the same capacity. There are operating-cost benefits too. The high speed of the canned pump delivers the

desired head and capacity at a considerable reduction in horsepower. For example, a 3450-rpm unit may require only a 3/4-hp motor.

**Results:** The switch to the canned pump caused service life to skyrocket almost immediately from weeks to months. Based on the excellent performance of the pilot unit, all pumps handling chlorosilanes were promptly replaced with the canned, all-welded design. Sizes ranged from one to 15 horsepower.

If regularly scheduled inspection and maintenance procedures are adhered to, life expectancy for the pumps should be indefinite. The only maintenance required has been the replacement of bearings. These are now changed annually, according to the adopted repair schedule.

(Further information about canned pumps used in the process may be obtained by checking No. 2234 on Reader Service Slip opposite last page.)



Gunpowder mixing unit consists of two opposed-type screw agitators housed in a one-inch-thick tally bowl shown here. Top portion of the bowl and agitator troughs are fabricated of AMPCO metal plate; bottom ends are sand-cast AMPCO metal.

## Practically no wear in 1½ years of mixing explosives!



### Mixer is made of strong, tough AMPCO® metal to resist abrasion

The highly abrasive effect of dynamite wears most metals mirror-smooth in a hurry. Yet, in one powder plant—after 1½ years' service — components of this mixing bowl still show the original grinding marks made during fabrication!

The mixer is all AMPCO metal, a high-strength copper-base alloy — even to the weldments. Sand casting and plate of AMPCO metal are welded together with Ampco-Trode weldrod of similar physical and chemical characteristics.

Resistance to abrasion — and to erosion and corrosion — is just part of the story. Because AMPCO metal is also spark-resistant, the hazards of explosives mixing are minimized.

Call in the field engineer and discuss ways you can use AMPCO metal profitably. Or write for details. Ampco Metal, Inc., Dept. 131-C, Milwaukee 1, Wis. West Coast Division: Huntington Park, Calif. — Southwest Division: Garland (Dallas County), Texas.



One of two screw agitators cast of AMPCO metal and then machined.

# AMPCO

Check 2235 opposite last page.

TS-56



*In fact, it can make the difference between minimum fire damage and extended production down-time on valuable processing equipment and buildings.*

As the pioneer in thermal-insulation protection, Foster has the industry's longest and deepest experience in designing systems to resist virtually all combinations of abuses — weather, fire, corrosive atmospheres, physical wear-and-tear. And . . .

**only foster** provides a Flame-Spread Index rating for every coating, adhesive, sealer and mastic we manufacture.

**only foster** meets *all* the requirements for thermal-insulation protection in military specifications, G.S.A. standards, state and local fire codes as well as industrial safety standards.

**only foster** displays the Underwriters' Laboratories label on its Fire-Resistive Mastics.

THERE'S A GOOD CHANCE that

we can answer even your most severe thermal-insulation PROTECTION problem.

Let us try. Write us the details—  
you're under no obligation, of course.



A symbol of  
fire resistive  
construction

COATINGS, SEALERS, ADHESIVES FOR THERMAL INSULATION

**BENJAMIN foster COMPANY**

Division of Amchem Products, Inc.

4635 WEST GIRARD AVE. — PHILADELPHIA 31, PA.

Check 2236 opposite last page.

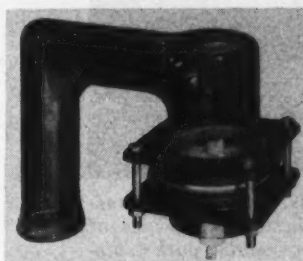
## CORROSION CONTROL

### **Vacuum breakers are adjustable, resist corrosion**

**Uses:** Controlling vacuum in processing equipment.

**Features:** Corrosion-resistant vacuum breakers are transparent and spring-loaded for adjustable release settings over wide vacuum range. Units have patented lip seal.

**Description:** Models are available for either vertical, side or top mounting. Units come in 1", 1½, 2 and 3" valve sizes. In addition to



"See-through" vacuum breaker features glass-Teflon construction

Pyrex-brand glass and Teflon construction, vacuum breakers are available made of stainless steel, Teflon-lined steel or other special materials.

(Vacuum breakers are product of Chem Flow Corporation, Little Falls, New Jersey.)

Check 2237 opposite last page.

### ► A NEW SOLUTIONS ARTICLE

**Switch to sealless pump  
halts gland leakage,  
motor burnouts**

**Problem:** Leakage from pump shaft glands burned out an average of two motors per month at Hudson Wire Company, Ossining, New York. The centrifugal pumps were used to send 110°F alkaline plating solutions through filters.

The corrosive fluid leaking through the gland would travel along the pump shaft into the motor. Often, glands were tightened to the point of stalling the motors, but the glands still leaked.

**Solution:** The pumps were replaced by units having no

stuffing boxes, glands or shaft steels. Known as a flex-i-liner pump, transfer is accomplished by a rotor on an eccentric shaft, which turns within a flexible, plastic liner.

This creates a progressive squeegee action on the fluid trapped between the liner and the pump's PVC body block. No rotating part or metal contacts the fluid.

**Results:** The packless, seal-less pumps have satisfactorily ended the motor burnout problem. The only major maintenance required in three years of operation (plant is on a 20-hour day), has been an occasional replacement of a liner. This has been done during regular scheduled shut-downs. No production delays due to liner failures have been experienced.

Some minor leakage was initially encountered when metal fittings were used to connect plastic transfer hose to the pump's plastic body block. The metal units were replaced with plastic fittings and the joints sealed with Teflon tape.

Total parts cost for all pumps has been under \$100. This includes spare liners and non-recurring expenditures for plastic fittings.

(Flex-i-liner pumps are manufactured by Vanton Pump & Equipment Corporation, Hillside, New Jersey.)

Check 2238 opposite last page.

**Options available  
for dp transmitter's  
wetted parts**

Tantalum, Teflon, monel, and Hastelloy-C components have been made available by manufacturer of differential-pressure transmitters. Various combinations of these corrosion-resistant materials may be specified as options for the process-wetted parts in the instruments.

(Additional information about corrosion-resistant dp transmitters is available from Fischer & Porter Company, 974 Jacksonville Road, Warminster, Pa.)

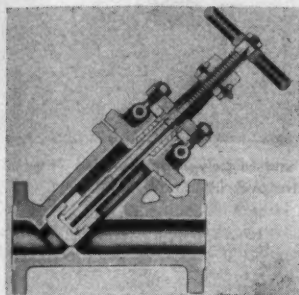
Check 2239 opposite last page.

**"Y" valves offered  
with Penton, Kel-F  
or Halon linings**

**Uses:** Controlling the flow of corrosive and erosive liquids.

**Features:** All wetted or inner parts and surfaces of valves are protected by plastic lining of either Penton, Kel-F or Halon.

**Description:** Bodies, bonnets and yokes of Y-valves are cast carbon steel. They can also be supplied in other alloys. Units are available in sizes ranging



Plastic-lined "Y" valve is especially designed to handle corrosive fluids

from one through three inches, with dimensions conforming to ASA Standard B16.5 for 150 psi.

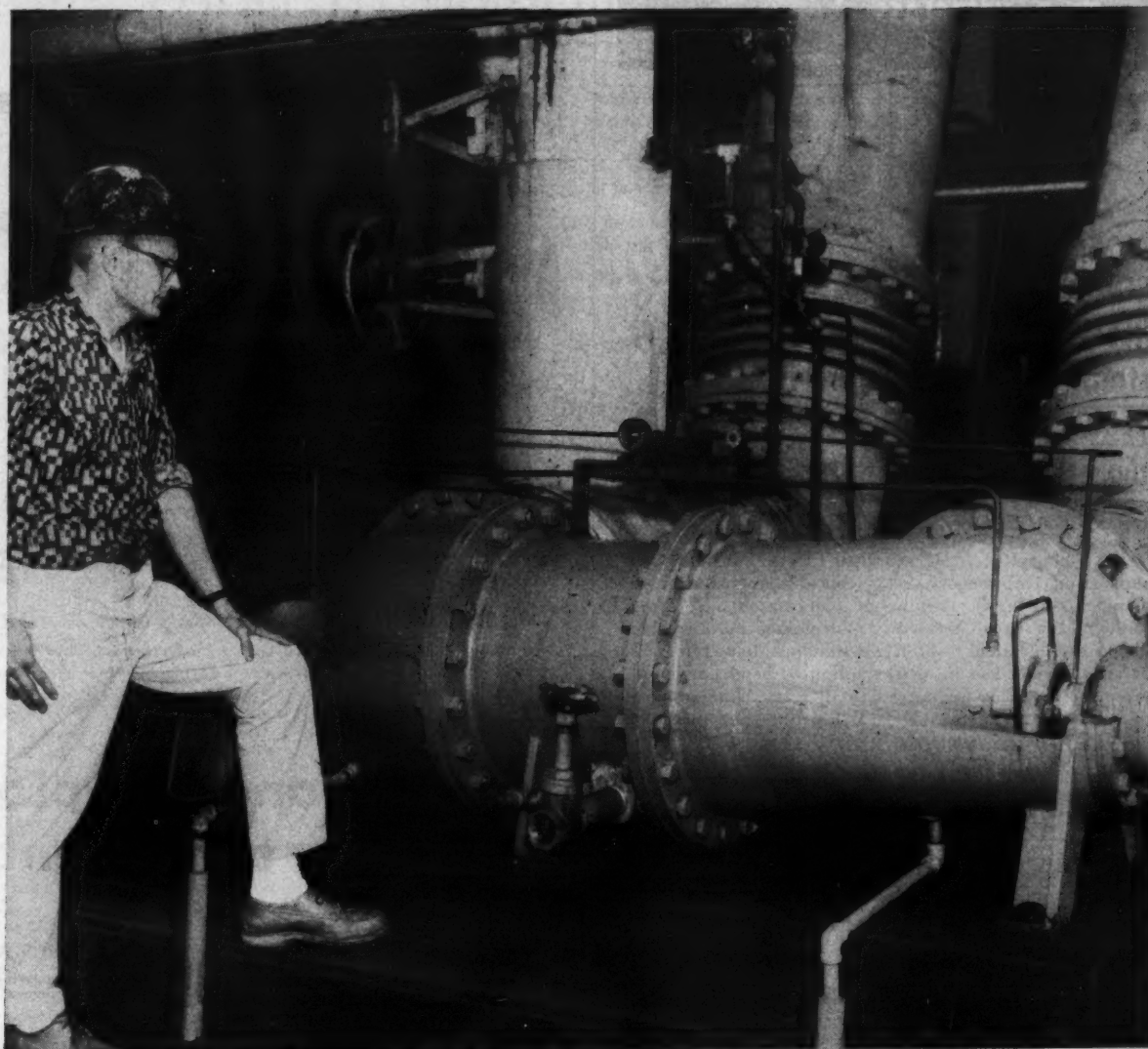
The specific type of plastic lining used is determined by service for which valve is intended. Maximum temperature limitation is 350°F.

(Plastic-lined Y-valves are product of The Wm. Powell Company, 2525 Spring Grove Avenue, Cincinnati 22, Ohio.)

Check 2240 opposite last page.

**NEXT MONTH**

How a Los Angeles area contact sulfuric acid plant blocked the threat of air pollution by installing a low-cost, fiber-type mist eliminator is revealed in our next issue. Besides assuring good community relations, the unit snares 1700 lb per day of H<sub>2</sub>SO<sub>4</sub>. Efficiency is 100% on acid particles greater than three microns, 94% on 0.3- to 3.0-micron specks.



## How a Salt Slurry Pump Licks both Corrosion and Abrasion

This pump of cast (Type CF-8M) Nickel stainless steel handles salt slurry at 220° F at International Salt's Avery Island, Louisiana, facilities.

In operation 36 months at 220° F, this circulating pump is a good example of how cast stainless steel containing 9% nickel helps reduce metals problems.

**Cuts back corrosion.** Cast Nickel stainless steel parts can provide excellent resistance to such oxidizing solutions as nitric acid and peroxides, as well as mixtures of sulfuric, phosphoric, and similar acids with ferric, cupric, mercuric, and chromic oxidizing salts.

**Cuts back abrasion.** Nickel stainless steel has the hardness to withstand

severe wear caused by slurries and other suspensions.

**Cuts back costs.** Nickel stainless steel castings offer the advantage of moderate initial—as well as lower maintenance costs—because of their durability in high-corrosion service.

**Cuts the chance of product contamination as well.** Components made of Nickel stainless steel stay clean, bright and free of corrosion products under the most rugged processing conditions. For International Salt, this meant iron-free salt products.

There is a complete range of nickel-containing castings that can solve prob-

lems involving corrosion . . . or even punishing combinations of corrosion, heat, shock, and wear.

A detailed reference, "Heat and Corrosion-Resistant Castings—Their Engineering Properties and Applications" is available on request. Just drop us a card.

THE INTERNATIONAL NICKEL COMPANY, INC.

67 Wall Street  New York 5, N. Y.

# INCO NICKEL

MAKES METALS PERFORM  
BETTER LONGER

Check 2241 opposite last page.

**JH FIBERGLASS PLASTIC**

## TANKS

VISIBLE LEVEL  
MOLDED-IN GAUGE

**MORE-  
CORROSION  
RESISTANT than  
stainless steel**

**LESS-  
than HALF the COST**

for STORAGE & PROCESSING

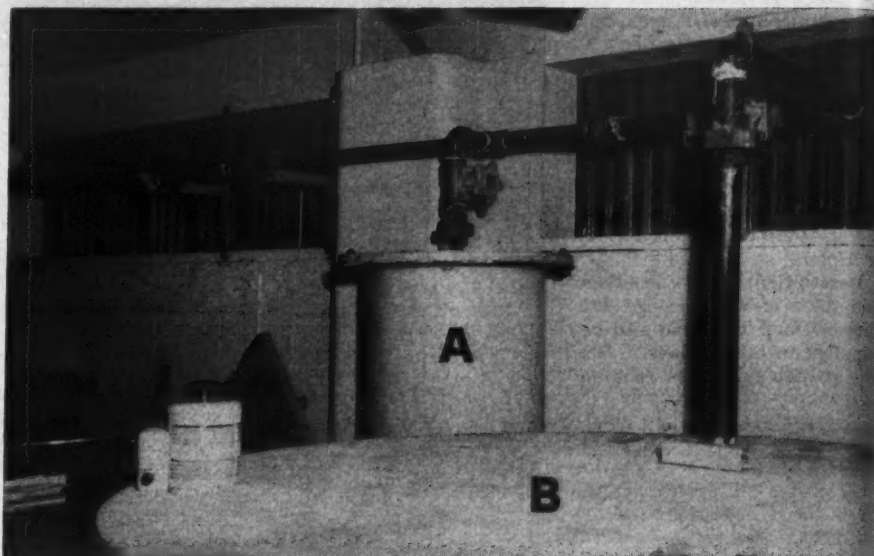
50 to 70,000 gallon J&H Fiberglass Plastic Tanks are self-supporting. Resist nearly every conceivable chemical. Are glass smooth inside. Require no painting outside. Translucent walls prove flawless construction; permit visual monitoring of liquid level. Eight standard diameters, from 24 inches to 24 feet in nearly unlimited height or length, are mass produced for immediate delivery. Outlets placed to your requirements. Write for brochure and price list.

Also PIPING TUBING & CUSTOM FABRICATION

JONES & HUNT INC. 102 Emerson Ave., Gloucester, Mass.

Check 2242 opposite last page.

## CORROSION CONTROL



Penton piping system leads to polypropylene filter tank (A) and to polypropylene-lined crystallization tank (B). Note Penton diaphragm valve over filter tank

## Penton and polypropylene team up to prevent corrosion

Hydrofluoric acid solutions, sulfuric acid and solvent are handled for four years with practically no maintenance

By GORDON WEYERMULLER, Senior Associate Editor  
With KENNETH W. BIRD, Process Engineer  
Wah Chang Corporation, Albany, Oregon

**Problem:** Hydrofluoric acid at concentrations up to 70% and temperatures to 210°F, dilute sulfuric acid and a ketone solvent had to be withstood by piping and equipment for a process at Wah Chang Corporation.

The process involves separation and purification of columbium and tantalum. Upgraded ore is dissolved in hydrofluoric acid. After separation of the undissolved ore, the clarified acid solution is fed to a solvent-extraction operation where the columbium and tantalum fluorides are separated and purified. The pure metal fluorides are converted to hydrated oxides, which are subsequently burned to pure oxides. The products from the plant are pure columbium and tantalum oxides.

Since high purity of product is re-

quired, an inert material was desired for piping and equipment. Also, it was important to avoid corrosion that could cause interruption of process.

**Solution:** After a number of plastics and metals had been considered for the piping system, Penton (chlorinated polyether) was selected as the material that exhibited the greatest degree of inertness to the conditions to be encountered.

Also, the extreme ease of installation and the comparative cost of Penton pipe, fittings and valves, versus pipe, fittings and valves made from other products which could handle this rough piping job, made Penton the most advantageous material that could be employed.

Accordingly, 1½" solid Schedule-80 Penton pipe and injection-molded fittings



## WRAP-ON

## RUST PROTECTION

**for any metal surface** Protect any metal surface from rust caused by fumes, oil, water, caustics, greases and most solvents. This tough polyvinylchloride pressure-sensitive tape provides positive protection on any clean, dry surface and conforms to odd or irregular shapes. Easy to apply, "SCOTCHRAP" Brand Pipe Protection Tape requires no special application technique or equipment and is always ready for use. "SCOTCHRAP" is available from your 3M supplier, or write: Electrical Products Division, 3M Company, 900 Bush Ave., St. Paul 6, Minn.

"SCOTCHRAP" IS A REGISTERED TRADEMARK OF 3M CO., ST. PAUL 6, MINN.

MINNESOTA MINING AND MANUFACTURING COMPANY  
... WHERE RESEARCH IS THE KEY TO TOMORROW



Check 2243 opposite last page.

# LOOK TO POWELL VALVES

You can count on Powell Valves for the answer to virtually any flow control problem where corrosion, erosion, temperature, or pressure are encountered. Because, at Powell, you'll find the largest selection of valves for the chemical industry.

For instance, only Powell offers you such a wide selection of materials—both ferrous and non-ferrous. This includes Stainless Steel, Nickel, Monel\*, Hastelloy#, Ni-resist\* and aluminum, just to mention a few.

Powell Corrosion-Resistant Valves are also rated up to 2500 pounds W.P. and for temperatures up to 1000F. For complete information and the answer to your corrosion, temperature or pressure problem, contact your nearby Powell distributor or write us directly.

\*Registered trade names of The International Nickel Company.

#Registered trade name of Haynes Stellite Company.



Discharge side of diaphragm pump in which hot (210°F) 15% HF solution of  $K_2TaF_7$  (potassium fluo-tantalate) is transferred to polypropylene-lined crystallization tanks through a Penton piping system

were installed. Diaphragm valves with solid Penton bodies were also used.

Polypropylene also was found to be satisfactory for the process conditions, and crystallization tanks were lined with sheet made from it. These tanks handle a 15% HF solution of potassium fluo-tantalate at 210°F.

The filter tank, which handles 20% HF tantalic acid solution at 150°F, is solid Penton.

**Results:** Maintenance on Penton pipe, fittings and valves, as well as on the polypropylene equipment, has been negligible since installation in early 1957.

(Penton and Profax polypropylene are products of Hercules Powder Co., Wilmington 99, Del.)

Check 2244 opposite last page.

(Penton pipe and fittings were supplied by Tube Turns Plastics, Inc., 30th and Magazine St., Louisville 11, Ky.)

Check 2245 opposite last page.

(Penton diaphragm valves were furnished by Hills-McCanna Company, 400 Maple Ave., Carpentersville, Ill.)

Check 2246 opposite last page.



115th year of manufacturing industrial valves for the free world

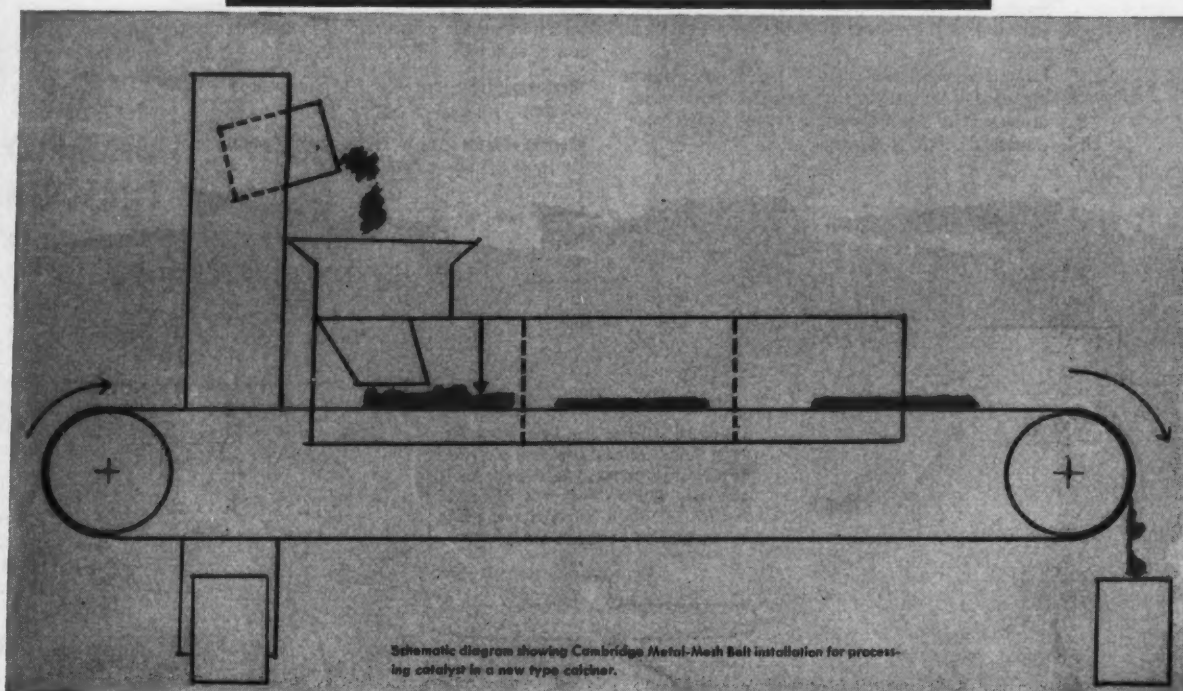
## POWELL CORROSION RESISTANT VALVES

THE WM. POWELL COMPANY CINCINNATI 22, OHIO



Check 2247 opposite last page.

## Cambridge Type 316 Stainless Metal-Mesh Belt



Schematic diagram showing Cambridge Metal-Mesh Belt installation for processing catalyst in a new type catcher.

### BEATS CORROSION PROBLEMS TO MAKE CONTINUOUS CHEMICAL PROCESSING MORE PROFITABLE

A Cambridge Belt works two ways to beat the tough operating problems that are usually a part of continuous chemical processing. First, careful, quality workmanship means a belt that lasts longer, gives fewer maintenance problems. Second, proper alloy selection can lick problems like corrosion or abrasion. Take corrosion for instance. The Cambridge Type 316 Stainless Steel Metal-Mesh Belt resists such corrosives as acetic acid vapors, chlorides, bromides and iodides. And, it has extra strength at high temperatures.

There is a complete line of Cambridge Belts in special and standard metals and alloys to meet your

specific requirements—custom-built in any weave to insure the most efficient processing.

Experienced Cambridge Field Engineers—experts in their field—are available to discuss your needs and help you select the belt best suited to your operations. Or, they can offer you sound advice on the installation, operation and maintenance of your Cambridge Belts. Talk to your Cambridge man soon. He's listed in the Yellow Pages under "Belting, Mechanical". Or, write for free 130-page reference manual.



See our data sheets in Chemical Engineering catalog, pages 1160, 1161 for technical information and representatives



**The Cambridge  
Wire Cloth Co.**

DEPARTMENT F • CAMBRIDGE 12, MD.

Manufacturers of Metal-Mesh Conveyor Belts, Flat Wire Conveyor Belts,  
Wire Cloth, Wire Cloth Fabrications, Gripper® Metal-Mesh Slings

Check 2248 opposite last page.

### CORROSION CONTROL

► A NEW SOLUTIONS ARTICLE  
**"Acid" test passed  
by 1000 plastic valves  
at Toms River**

In service more than a year  
on 25 filter presses

After a year of continuous attack from corrosive acids and alkalis, 1000 phenolic sampling valves have proven that they can take it. The units were part of valve tests con-



Forty phenolic valves were installed along the bottom of each of 25 filter presses processing variety of corrosive solutions

ducted on filter presses at the Toms River, New Jersey, plant of Toms River Chemical Corporation.

Forty valves were installed along the bottom of each of 25 presses that filter a variety of alkaline and acid solutions. All the valves were in constant contact with the liquid being filtered. A sample could be drawn at any time by a quarter-turn of a handle. Temperatures varied from 32 to 195°F, at pressures from 0 to 25 lb.

(Valves were manufactured by Continental Manufacturing Company, 4245 Alpine Ave., Cincinnati 42, Ohio.)

Check 2249 opposite last page.

(Further information about Durez molding compound No. 75 from which valves were made, can be obtained from Durez Plastics Division of Hooker Chemical Corporation, Niagara Falls, New York.)

Check 2250 opposite last page.

For more information on developments in this section, check the Reader Service Slip.

THAT'S  
INTERESTING

### Pigeons put out

Pigeons reportedly are turning up their noses at their accustomed accommodations in Doylestown, Pa.

The birds deserted their favored roosts on the new Buck county building after a transparent sticky compound was applied to roosting spots.

It remains tacky at 15°. Called 4-The-Birds, it is made by A. Z. Bogert Co.

### Keeping GIs dry

Soldiers, wearing clothing treated with a new water- and oil-repellent, kept dry for 12 hr while walking in simulated showers of 1"-per-hr intensity. Clothing also withstands repeated washings.

The treatment, called Quarpel, a combination of quaternary ammonium salt with nonionic fluorocarbon, is applied in one bath.

For more information on product at right, specify 2251 see information request blank opposite last page.



# ACE

## HARD RUBBER ACID PUMPS

THE PUMPS TO SEEK WHEN OTHERS LEAK...

Only a *simple* design can survive with reliability in acids, bleaches, brines and other corrosives. When Ace pumps endure for years in 12% hydrofluoric acid, switched on and off every 30 seconds, 24 hours a day, that's proof! When other Ace pumps, handling 2½ million gallons of brine, outlive 15,000 on-off cycles, that's more proof!

Working surfaces in Ace pumps are *hard rubber*... more resistant to more chemicals, stronger, tougher and more adaptable, simpler in design.

In Ace centrifugal pumps, for instance, impellers are hard rubber *molded right on the shaft*. No vulnerable threads or keys. Bladed backs of impellers keep seals clean, and the by-pass which lubricates the packing is integral with the stuffing box. Rubber-covered shaft with ring seal, or Hastelloy with conventional packing.

Here are brief details of four Ace best sellers. What you'd really like to see is the *price*... *considerably less* than most alloy metal pumps.

Write today. Ask for Pump Manual CE-55.



CHEMICAL EQUIPMENT DEPARTMENT



## American Hard Rubber Company

ACE ROAD, BUTLER, NEW JERSEY • Tel.: TE 8-1000



**WE Centrifugal Pump:**  
Capacity 350 gpm.  
Cast iron casing lined  
with hard rubber.  
Tough, hard rubber  
impeller.



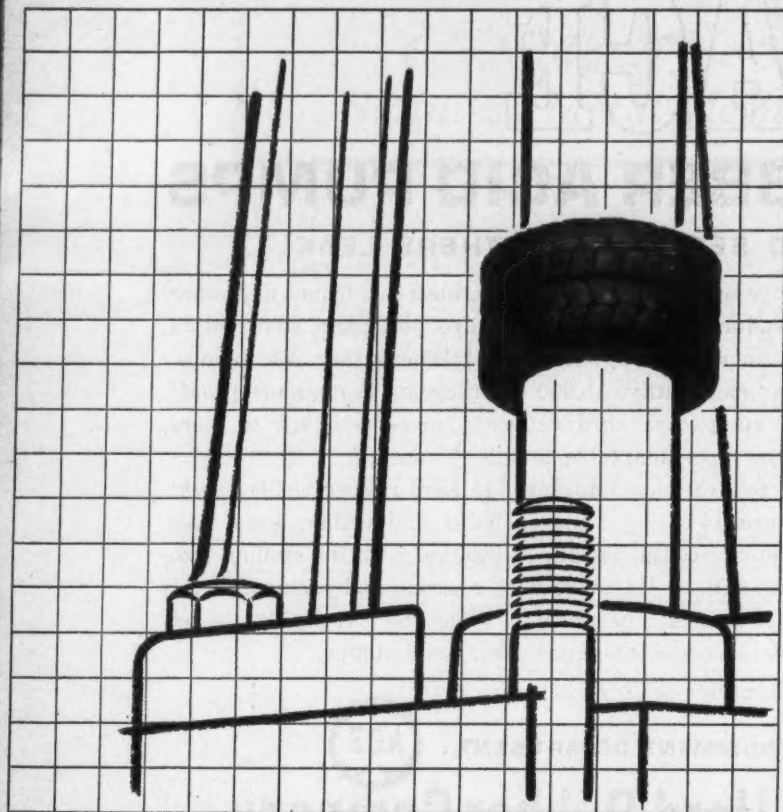
**Ace Rotary Gear Pump:**  
Low-cost 11 gpm. acid  
transfer pump. Wear-  
resistant hard rubber  
gears and casing.  
Kel-F bearings.



**Ace Jabsco Neoprene  
Impeller Pump:**  
Handles amazing  
volume. 15 gpm. at  
22 ft. head to 5 gpm.  
at 72 ft. Hard rubber  
casing, neoprene  
impeller. Self priming.



**WA Centrifugal Pump:**  
Capacity to 85 gpm.  
Solid hard rubber  
volute case, stuffing  
box and impeller.  
Finest non-metallic  
acid pump ever.



## R/M CAPABILITY PRODUCES ASBESTOS-TEFLON\* PACKINGS

with low breakaway friction and excellent resistance against most solvents, acids and other chemicals

When you install R/M Nos. 840SW and 840SB braided and "Teflon"-impregnated packings or R/M No. 848 "Teflon" filament packing on your valves and pumps you can forget the troubles normally associated with acids and corrosive fluids. They represent the most effective combination of materials for resisting solvents, acids and other chemicals—high grade asbestos yarn and "Teflon." And they eliminate the need for lubricants that might contaminate the materials handled. They are specified as original packings by many manufacturers of chemical-handling valves and pumps.

R/M No. 840SW is designed primarily for use in pumps and valves handling solvents, R/M No. 840SB is most effective in resisting strong acids and corrosive fluids, R/M No. 848 is usually applied where strong and concentrated acids, solvents and slurries are conveyed.

We will be glad to recommend packings for any special requirements you may have. Consult us—and send for a copy of our new Catalog P-100 containing complete information on R/M Mechanical Packings and Gasket Materials.

\*Registered trademark for DuPont fluorocarbon resins

**RAYBESTOS-MANHATTAN, INC.**



**PACKINGS**

PACKING DIVISION, PASSAIC, N.J.

MECHANICAL PACKINGS AND GASKET MATERIALS

Check 2252 opposite last page.

## CORROSION CONTROL

**Pipeline coating device can be operated by single man**

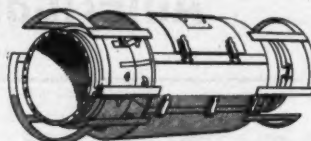
Coats pipes up to 12 inches in diameter

**Uses:** Applying cold, mastic-type coatings to pipelines ranging in diameter from ¾ to 12 inches.

**Features:** Device permits one man to perform coating job with ease. Unit is simply pulled along the line, rotated occasionally to deposit equal amounts of mastic to the pipe.

**Description:** Coater is essentially a hollow cylinder with coating shoes at both ends. Pieces of heavy-duty carpet fit into coating shoes at ends of cylinder. Baffle plates inside cylinder assure that mastic will be lifted and deposited on top of pipe when coater is rotated.

Large trap door on top of cylinder is used for filling and



To coat a pipe, unit is simply placed on pipe and pulled. Device is adjustable to achieve desired film thickness

emptying. Coater may be operated either forward or in reverse. Coating shoes can be easily replaced.

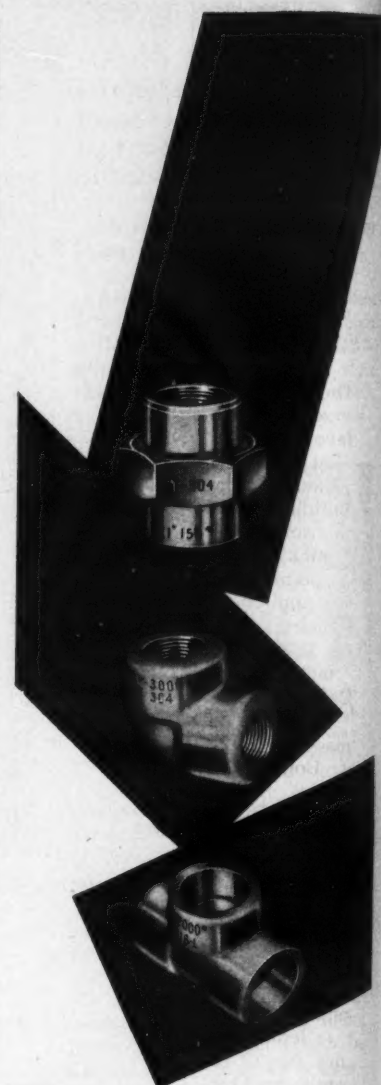
Device is available in three sizes: small, medium and large. Medium size unit has overall length of 30 inches and weighs 35 lb empty. It holds 10 gal of mastic.

(More information about Roskoter may be obtained from Royston Laboratories, Inc., Blaw Knox, Pittsburgh 38, Pennsylvania.)

Check 2253 opposite last page.

Corrosion-resistant, volumetric feeder for acids, alkalis or slurries is summarized in four-page specification sheet. Feeding range is five to 1800 gph. Accuracy is within one percent. Spec Sheet "Model 65 Feeder" — B-I-F Industries.

Check 2254 opposite last page.



## CAMCO

### Screwed & Socketweld FITTINGS

• 150 Lb. through 6000 Lb. Stainless Steel Screwed and Socketweld Fittings • 2000 Lb. through 6000 Lb. Forged Steel Screwed and Socketweld Fittings • Extra Heavy Stainless and Forged Steel Unions • Light Weight Forged Steel Back-Up Flanges for use with Schedules 5 and 10 Stainless Piping.

**CAMCO FITTINGS, INC.**  
301 State St., No. Haven, Conn.

Send for Complete Catalog and NEW Price List



Check 2255 opposite last page.

CHEMICAL PROCESSING

## CORROSION CONTROL

### **Salt traces speed hi-temp oxidation of superalloys**

The effect of contaminating salts on corrosive attack at high temperatures, with and without applied stresses, has been studied for five superalloys currently of importance in high-temperature applications. The alloys studied were Inconel X and Inconel 702, nickel alloys with 15-16% chromium; M-252 and Rene-41, nickel base with 18-20% chromium plus 9-11% cobalt; and WF-11 (Haynes 25), a cobalt base alloy.

It was found that 1.5 mg/sq cm KCl and LiF will cause severe oxidation and accelerated failure in creep-rupture tests in air at 1600 to 1900°F. LiF was a stronger corrosive agent than KCl. Rankings on the tests, regarding creep-rupture properties, were similar for coated and uncoated series of specimens. WF-11, Rene-41 and M-252 provided longest creep life, Inconel 702 less and Inconel X least. Stress caused no significant difference in corrosion mechanisms.

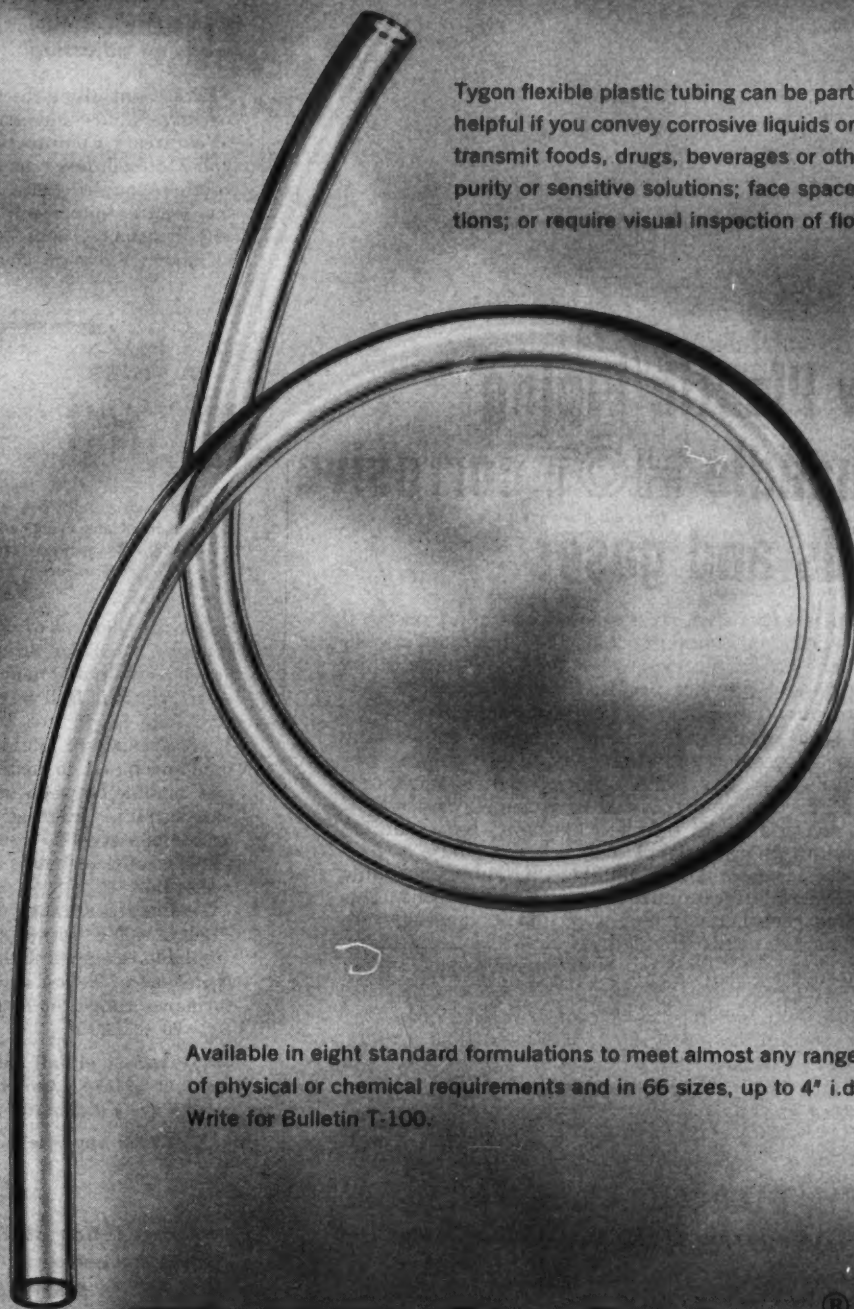
### **Oxides and Spinels Are Formed**

Tests indicated that the salts prevent formation of normal protective oxide coatings. Products of corrosion were mainly oxides and spinels with only small amounts of chromates. Very severe damage was done to test specimens in air, but little or no corrosion occurred in argon.

Oxidation was found to: 1) Severely attack the surface, remove metal and quickly perforate thin sheets; 2) penetrate intergranularly; 3) cause subsurface voids in the metal by removal of chromium.

(Condensed from paper by A. Moskowitz and L. Redmerski, presented at the National Association of Corrosion Engineers 17th Annual Conference, Buffalo, N.Y.)

(For more details on superalloy corrosion, contact Crucible Steel Company of America, P. O. Box 7257, Pittsburgh 13, Pennsylvania)



Tygon flexible plastic tubing can be particularly helpful if you convey corrosive liquids or gases; transmit foods, drugs, beverages or other high purity or sensitive solutions; face space limitations; or require visual inspection of flow.

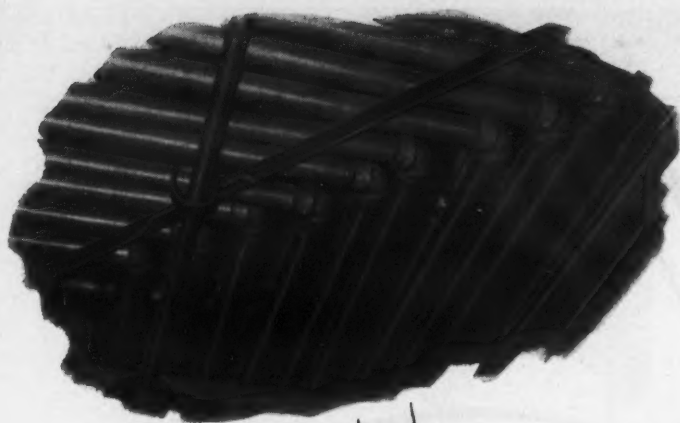
Available in eight standard formulations to meet almost any range of physical or chemical requirements and in 66 sizes, up to 4" i.d. Write for Bulletin T-100.

# TYGON®

A PRODUCT OF THE U.S. STONEWARE CO., AKRON 9, OHIO

264-G

Check 2256 opposite last page.



## Now Plastic Piping to handle **HOT**, corrosive fluids and gases

Corrosion is expensive. It increases operating costs. It requires additional maintenance and reduces plant operating efficiency. And, previously, as the temperature of the fluids or gases being handled increased, expensive alloy and non-metallic piping systems were required.

Now, at costs substantially lower than other comparable materials, "Penton"\* (chlorinated polyether) piping systems handle corrosive fluids and gases at temperatures up to 250°F. This new polymer is extremely resistant to thermal degradation at elevated temperatures, retaining high strength characteristics over a broad range of temperatures. It is essentially unaffected by either inorganic or organic agents, including aromatic hydrocarbons. This outstanding resistance to corrosive attack, coupled with its high degree of dimensional stability at elevated temperatures enables "Penton" piping systems to handle chemicals that even metals cannot.

Widely varying conditions including temperature, pressure and concentrations of fluids or gases being handled require each proposed piping system to be carefully selected. Should any questions arise, Tube Turns Plastics' engineers will be happy to consult with you on your corrosion problems. For additional information, call or write today.

### TUBE TURNS PLASTICS, INC.

30th and Magazine Street, Louisville 11, Kentucky



*Mark of progress in industrial plastics piping*



For quick, easy joining of "Penton" pipe, fittings and valves, the new THERMO-SEAL\* heat tool produces permanent, leakproof joints that are stronger than the pipe itself. By placing the units to be joined on the tool, heating and then assembling, the joint is completed and ready for use in a matter of seconds. See it in action. Consult your nearby Tube Turns Plastics distributor today.

\*"tpp" and "THERMO-SEAL" are trademarks of Tube Turns Plastics, Inc.

\*"Penton" is a trademark of Hercules Powder Co.

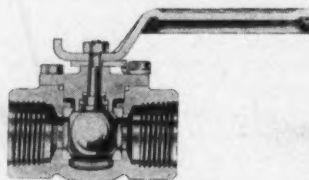
Check 2257 opposite last page.

### CORROSION CONTROL

**Precision ball valve  
hasn't any springs,  
needs no adjusting**

**Uses:** Controlling the flow of corrosive fluids and gases.

**Features:** Combination of type-316 stainless steel construction coupled with Teflon seat assures maximum corrosion resistance and life expectancy. Valve is manufac-



Teflon seat in ball valve is precision molded and machined to insure tight fit between seat and ball surfaces

tured to close tolerances, avoiding need for adjustment or take-up maintenance.

**Description:** Ball valves are available in 1/4 to 2" sizes. Teflon seats are molded and then machined to insure perfect mating between seat and ball surfaces. Internal springs or compensators to counteract wear at critical points are not needed.

Temperature range is from -20 to 400°F. Units are also available equipped with Buna-N instead of Teflon seats. Performance range for these units is -20 to 220°F.

(Stainless-steel ball valves are product of the Lunkenheimer Company, Cincinnati, Ohio.)

Check 2258 opposite last page.

**Low-cost Teflon packing  
resists corrosives  
at -90° to 500°F**

**Uses:** Packing pumps, valves, expansion joints and other devices coming into contact with acids, alkalis and corrosives.

**Features:** Teflon-impregnated packing is reported to cost 40% less than conventional Teflon-treated packings. Product withstands temperatures ranging from -90 to +500°F.

**Description:** Packing con-



## HERE ARE FACTS ABOUT TWO IMPORTANT CONTINUOUS LAB MIXERS



For research, experimental and small pilot plant applications two new Oakes Mixers are now available. Tops for multiphase systems, they're unequalled when chemical reactions depend upon the continuous exposure of one or more of the reacting substances. Capacities, geared for lab service are 30 to 180 pounds per hour.

All the exclusive features of Oakes production models are included. Completely enclosed and sanitary, these corrosion resistant stainless steel mixers can be quickly disassembled for cleaning. Power and maintenance needs are low.

Model 4MBH has a bearing housing and shaft extension. It can be belt driven by one of your own motors.

Model 4MV, an integral unit, is available with variable speed power drive in three horsepower sizes.

Write for details and literature describing continuous automatic mixing and the complete line of Oakes Continuous Automatic Mixers.

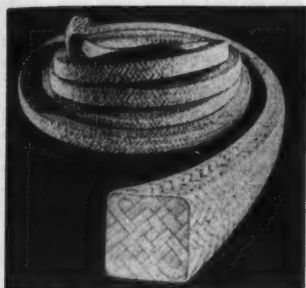
### THE E. T. OAKES CORPORATION

26 COMMACK ROAD  
ISLIP, LONG ISLAND, NEW YORK

## CORROSION CONTROL

tains more than 30% Teflon by actual weight. Product has high stability under temperature changes, resists glazing, swelling and attack from corrosives.

Material is available in two styles: As a Teflon-impregnated blue asbestos and as a white asbestos. Former is rec-



Teflon-impregnated asbestos packing has good stability at high temperatures

ommended for general chemical service including edible liquids, oils, gasoline and water. Latter is specifically designed for strong caustics and acids.

Packings are available in reel or spool form in sizes 1/4" through 1".

(Further information about Lattice Braid packing may be obtained from Garlock Inc., Palmyra, New York.)

Check 2260 opposite last page.

### NEW LITERATURE

#### Corrosion Control

Impervious graphite globe valves are illustrated in two-page bulletin. Cutaway sketches show construction of valves. Cat Section S-7120 — National Carbon Company, division of Union Carbide Corporation.

Check 2261 opposite last page.

Polyethylene tanks for handling acids and other corrosives are reviewed in two-page bulletin. Prices and specifications are listed for units ranging in capacity from ten to 350 gallons. Upper temperature limitation is 180°F. Bul APT-5-61—Apex Reinforced Fibre-Glass Division of White Sewing Machine Corporation.

Check 2262 opposite last page.

## GAR-LINE PENTON TANK LININGS

for High-Temperature  
Corrosion Proofing



Tailored to your specific needs, GAR-LINE\* Penton\*\* Linings can be applied to a variety of complex shapes as shown in these photos.



Can be applied to virtually any surface or contour to give superior, low cost protection against high-temperature corrosion. GAR-LINE Penton Tank Linings are replacing and outperforming more expensive materials in an ever-increasing number of applications.

Serviceable at temperatures up to 280°F, these efficient linings embody outstanding tensile strength, excellent dimensional stability and low water absorption. Chemically, they resist bleaching agents, solvents, plating solutions . . . in fact, all inorganic acids except fuming nitric and fuming sulfuric.

Applied by carefully selected and authorized applicators. The experience of these tank lining experts guarantees satisfactory GAR-LINE Penton installation, prevents expensive failure due to improper application. Approved applicators include:

ABRASION & CORROSION ENGRS.  
1205 N. McMasters Street  
Amarillo, Texas

ATTBAR PLASTICS  
1107 Northeast 106th Street  
Vancouver, Washington

BARTHEL CHEMICAL CONST.  
CO., INC.  
P. O. Box 1025, Tacoma 1, Wash.

BITTNER INDUSTRIES, INC.  
91 Diaz St., P. O. Box 10265  
Prichard, Alabama

BUCKLEY IRON WORKS  
21 Christopher St., Dorchester, Mass.

BUFFALO LINING &  
FABRICATING CORP.  
73 Gillette Ave., Buffalo 14, N.Y.

CEILCOTE COMPANY, INC.  
4832 Ridge Rd., Cleveland 9, Ohio

CHEMICAL PROOF OF SEATTLE  
625 Alaska Ave., Seattle, Wash.

ELCHEM ENGRG. & MFG. LTD.  
P. O. Box 249  
Burlington, Ontario, Canada

ELECTRO CHEMICAL ENGRG.  
& MFG. CO.  
750 Broad St., Emmaus, Penn.

THE FABRI-FORM COMPANY  
P. O. Box 125, Byesville, Ohio

FLORIDA CORROSION CONTROL  
P. O. Box 10062, Jacksonville 7, Fla.

THE FORTUNE COMPANY  
1100 W. 37th St.—North  
Wichita 14, Kansas

GALIGHER COMPANY  
545 West 8th—S., Salt Lake City, Utah

GATES RUBBER COMPANY  
Denver, Colorado

GOLDEN PLASTICS CORP.  
333 East 8th St., Oakland 6, Calif.

GOODALL RUBBER COMPANY  
2050 N. Hawthorne Avenue  
Melrose Park, Illinois

HANSZEN PLASTICS COMPANY  
835 S. Good-Latimer Expr.  
Dallas, Texas

HEIL PROCESS EQUIPMENT CORP.  
12901 Elmwood Ave., Cleveland 11, O.

HUNTINGTON RUBBER MILLS  
of Port Coquitlam  
B.C., Canada

INNER-TANK LINING CORP.  
4777 Eastern Ave., Cincinnati 26, O.

MAURICE A. KNIGHT  
Kelly Ave., Akron 9, Ohio

MERCER RUBBER CORPORATION  
Highway 46, Cor. Huyler  
Little Ferry, New Jersey

METALWELD, INC.  
Scotts Lane & Abbottsford Rd.  
Philadelphia 29, Pennsylvania

PARKER BROTHERS, INC.  
7044 Bandini Blvd.  
Los Angeles 22, California

PLASTIC APPLICATORS, INC.  
7020 Katy Road, P. O. Box 7631  
Houston 7, Texas

PROTECTIVE COATINGS  
1602 Birchwood Ave., Ft. Wayne, Ind.

ROANOKE BELTING & RUBBER CO.  
P. O. Box 1593, 345 Center Ave., N.W.  
Roanoke 7, Virginia

RUBBER ENGINEERING & MFG. CO.  
P. O. Box 2335, Salt Lake City 10, Utah

RUBBER MILLERS, INC.  
707 S. Caton Ave., Baltimore, Md.

ST. LOUIS METALIZING CO.  
625 S. Sarah St., St. Louis 10, Mo.

L. H. SHINGLE CO.  
1300 Walnut St., Camden 3, N.J.

STEBBINS ENGRG. & MFG. CO.  
Watertown, New York

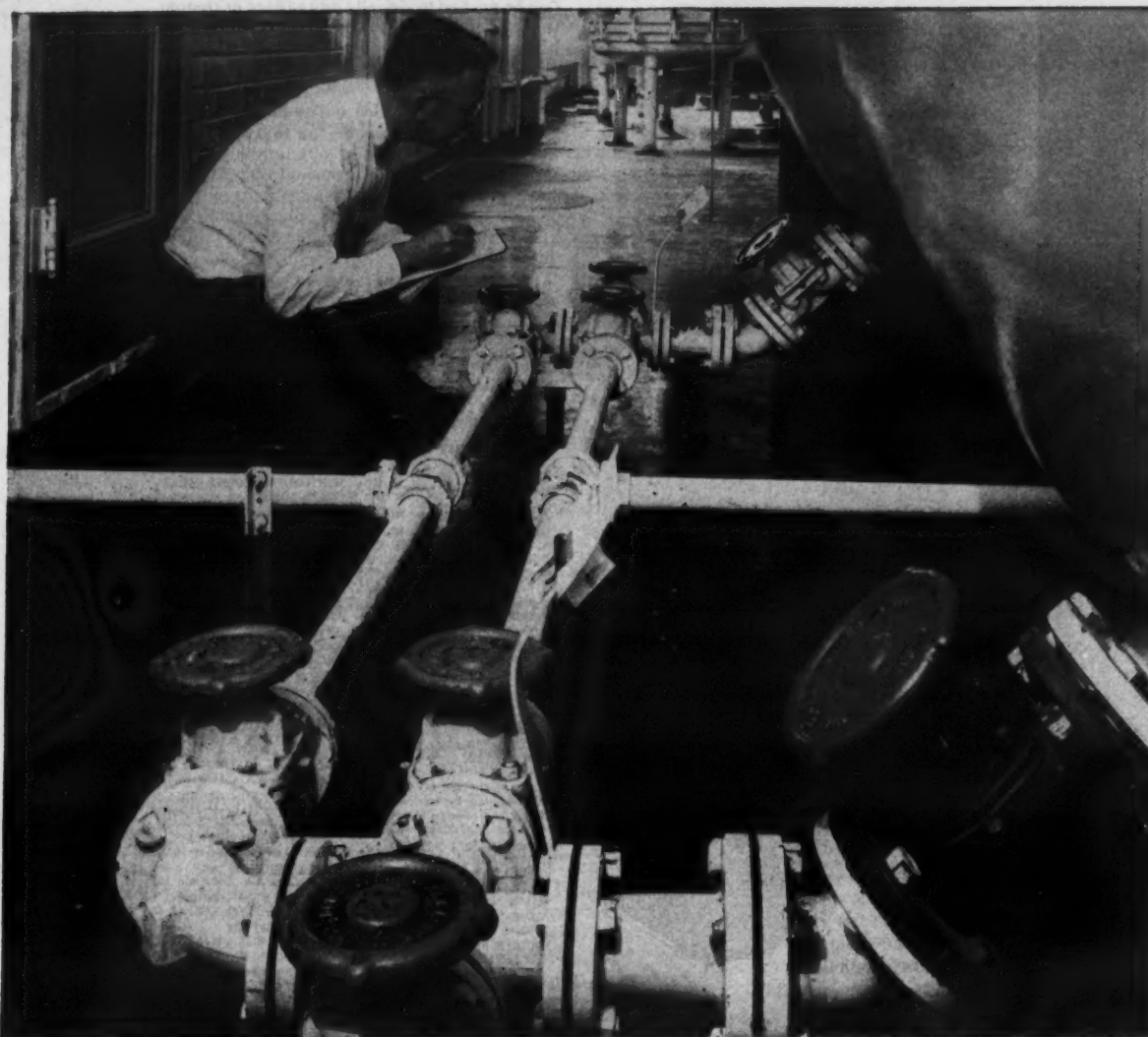
WILLOW RUN RUBBER COMPANY  
12575 Haggerty St., Bellville, Mich.

Investigate GAR-LINE Penton Tank Linings as the answer to your corrosion problems. For more information, contact the applicator nearest to you. Or, write for data on Penton; information also available on Teflon† linings for Anti-Stick or corrosive applications. Special Products Dept., Garlock Inc., P. O. Box 612, Camden 1, New Jersey.

\*Garlock Registered Trademark  
\*\*Registered Trademark, Hercules Powder Company  
†Registered Trademark, The DuPont Company

# GARLOCK

Check 2263 opposite last page.



Parke, Davis & Company, Detroit, Michigan

## SARAN LINED PIPE—keeps $H_2O_2$ prescription-pure ...not one failure in three years!

The cargo: 3% pharmaceutical-grade hydrogen peroxide and deionized water . . . carried by a 300-foot pipeline, at floor level near heavy-traffic areas. Pipeline failure would cost \$500 per hour in production downtime. Saran Lined Pipe keeps this reactive material prescription-pure, without one case of breakage or failure from corrosion in three years' service!

At Parke, Davis & Company, Detroit, a 300-foot pipeline carries the peroxide solution from dilution tanks to the bottling line. "Three years ago, this line—which used to be ceramic pipe—needed rerouting. At half the cost of dismantling and reassembling the ceramic pipe, we built

the new line entirely of Saran Lined Pipe," says Department Manager D. W. Anderson. "The line went up rapidly because its longer pipe sections resulted in fewer joints and its strength eliminated the cost of extra supports."

No matter how corrosive or reactive your chemical material, consider Saran Lined Pipe. Saran Lined Pipe, fittings, valves and pumps are available for systems operating from vacuum to 300 psi, from below zero to 200° F. They can be cut, fitted and modified easily in the field without special equipment. For more information, write Saran Lined Pipe Company, 2415 Burdette Avenue, Ferndale, Michigan, Dept. 1563LG12.

THE DOW CHEMICAL COMPANY



Midland, Michigan

Check 2264 opposite last page.

## CORROSION CONTROL

**Pipeline coating device** capable of being operated by one man, is described in four-page illustrated folder. Unit can apply cold mastic coatings to pipes ranging from  $\frac{3}{4}$  to 12" in diameter. Bul "Roskoter"—Royston Laboratories, Inc.

Check 2265 opposite last page.

**Performance of three polyester resins** in various corrosive aqueous solutions at elevated temperatures for periods up to one year is reviewed in 16-page bulletin. Curves illustrate strength retention of the various resins after immersion. Tables indicate other effects that the corrosive media had on the resins. Report, "A Continuation of the Comparative Study of the Corrosion Resistance of a Bisphenol-A Polyester and Various Other Polyester and Epoxy Resins"—Atlas Chemical Industries, Inc.

Check 2266 opposite last page.

**Glass-lined equipment** is topic of eight-page brochure. Data is provided about reactors, dryer-blenders, tanks, columns, condensers, pipe and fittings. Removable-blade agitators are also discussed. Bul MG-105—A. O. Smith Corp.

Check 2267 opposite last page.

**How to reduce sludge** in boilers and recirculating cooling systems is told in four-page bulletin. Several case histories dealing with sludge accumulation problems are included. Bul HSP-to 941—Hagan Chemicals & Controls, Inc.

Check 2268 opposite last page.

**Corrosion- and abrasion-resistant flexible metal hose** is described in recently issued bulletin. Products are specially designed for gravity or pneumatic transfer of grains and bulk materials. Bul IPB-Sec 3A(a)—Universal Metal Hose Company.

Check 2269 opposite last page.

**Aluminum-impregnated steels** for high-temperature, corrosive service are reviewed in four-page data sheets. Materials resist sulfur-bearing atmospheres at gas temperatures up to 2200°F. Data Sheet MLSCO-A/11—Corrosion Tubing Division, M. L. Sheldon & Co., Inc.

Check 2270 opposite last page.

**Control problems** for producing corrosion-resistant black oxide coatings are discussed in four-page bulletin. Suggestions for solving these conditions through instrumentation are presented. Schematic drawings of processes are shown. Bul 064.1-2—The Bristol Company.

Check 2271 opposite last page.



IDEAS: from other industries and nuclear field  
— new trends in research, processes, services

## PROBLEM: Ultimate disposal of nuclear waste

## SOLUTION: None — yet!

Nuclear industry resorts to 'stop-gap' storage while pressing search for final solution; outside technologies are being called upon to explore some of most promising routes

By JAY GOSSETT  
Assistant Editor

IN THE TOO-BRIEF history of man's concern with pollution, it is doubtful if, in terms of time, talent and dollars spent, an effort has ever been massed comparable to that wrestling with the nuclear-waste-disposal problem.

An inkling of the magnitude of this effort and the problem engaging it can be gleaned from the fact that the latest literature search turned up 696 references to reports and published literature on the subject of nuclear-waste disposal.<sup>1</sup> This search covers the period from June 1958 to June 1960. It is merely a supplement updating a 123-page formal bibliography, *Radioactive Waste Processing and Disposal*<sup>2</sup>, which covered the period prior to June 1958.

Although this monumental effort has developed much

useful technology, the irrefutable fact remains that a final, permanent, safe-disposal technique for high-level radioactive wastes has not been developed. The industry is still resorting to temporary "stop-gap" measures for storing these wastes.

But there is hope. Walton A. Rodger, consultant to Argonne National Laboratory, recently prepared a study, *Radioactive Waste Disposal*<sup>3</sup>, to be used as a text for a series of lectures for the International Institute of Nuclear Engineering at Argonne.

His conclusion? "There would appear to be no reason for being pessimistic about the chances of solving this problem."

### Handling Decaying Atoms

The crux of the problem lies in the nature of the materials involved. Basically, radioactive material is composed of un-



Simulated non-radioactive solutions are being used in experiment at Carey Salt Company's Hutchinson, Kas., mine where feasibility of storing radioactive wastes in natural salt formations is being studied

(Photo courtesy of Oak Ridge National Laboratory, operated by Union Carbide Corporation for the U.S. Atomic Energy Commission)

stable or decaying atoms — atoms in which the nuclei are seeking stability, a status ultimately attained by emission of the excess energy.

If the decay of radioactive materials were completed in a relatively brief period, the problem of disposal would be simply one of temporary containment.

However, the radioisotopes involved decay slowly (see accompanying table) as witness the case of strontium<sup>90</sup>, which has a half-life of 28 years. Half-life is the amount of time required for the radionuclide

### Principal fission products in waste disposal operations

Radionuclide	Half-life
Strontium <sup>90</sup>	28.0 yr
Cesium <sup>137</sup>	26.6 yr
Promethium <sup>147</sup>	2.6 yr
Cerium <sup>144</sup>	290.0 days
Krypton <sup>88</sup> (gas)	10.3 yr
Iodine <sup>131</sup> (gas)	8.1 days
Zirconium <sup>95</sup>	63.0 days
Barium <sup>140</sup>	12.8 days
Ruthenium <sup>106</sup>	41.0 days
Ruthenium <sup>106</sup>	1.0 yr
Strontium <sup>90</sup>	54.0 days

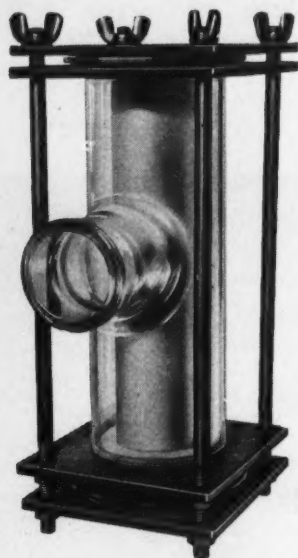
<sup>1</sup>Radioactive Waste Processing and Disposal, bibliographical supplement, June 1960. TID-3555, \$2.25, OTS, U.S. Department of Commerce, Washington 25, D.C.

<sup>2</sup>Radioactive Waste Processing and Disposal, bibliography, June 1958, TID-3311, \$2.75, OTS, U.S. Department of Commerce, Washington 25, D.C.

<sup>3</sup>Walton A. Rodger, *Radioactive Waste Disposal*, 169 pages, Sept. 1960. ANL-6233, \$2.75, OTS, U.S. Department of Commerce, Washington 25, D.C.

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Check 2272 opposite last page.

to lose half its excess energy.

### Two Approaches Open

Since modern science has not been able to uncover a means for speeding up radioactive decay, there are really only two basic approaches open for solving the problem: dispersal and containment.

As long as the nuclear industry is in its infancy, dispersal is feasible for some wastes. For the long haul, however, it has been virtually ruled out.

It is estimated that the quantity of strontium<sup>90</sup> which is likely to accumulate during the period 1960-2000 would require 8% of the world's total ocean volume for safe dispersal.

Consequently, containment offers the best hope for ultimate disposal of high-level radioactive wastes. This is essentially what is being done with high-level wastes at present: they are being stored in tank farms and burial sites.

This approach is considered temporary or stop-gap for two reasons: 1) Nobody knows definitely how long the tanks being used will last, nor exactly what would be the consequences of a tank springing a leak. 2) Burial grounds require isolated areas and special geological and hydrological characteristics. Too little is known about what happens to the wastes after they are deposited. As long as the quantities are small, the situation is not likely to become acute. However, land requirements are increasing steadily. At Oak Ridge National Laboratory, five burial sites have been employed since the beginning of operations. Three have been abandoned and Burial Ground No. 4, a 25-acre site, was filled rapidly, land requirements increasing from about 1.5 to 5.0 acres per year.

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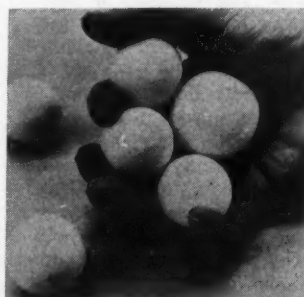
It is interesting to note that researchers are currently shooting for a safe resting

place for high-level waste which would cost no more than \$1000 per cubic foot. Ultimately, it is hoped to bring this down to \$100 per cubic foot. Even the \$1000-rate would add only 0.04 mill/kwh to the cost of electricity generated by nuclear power plants. For this reason, the waste-disposal problem is not considered to be a stumbling block to competitive nuclear power.

Efforts currently are being aimed at: 1) reducing the volume of the waste, 2) encasing it in a package which itself offers some promise of long-term integrity and 3) storing it in a place where the likelihood of the waste's being contacted by water is low.

At Los Alamos Scientific Laboratory, experiments are being conducted with ceramic spheres for soaking of liquid high-level wastes. The spheres, developed by Coors Porcelain, Golden, Colo., have micron-size pores and each is capable of absorbing at least 40% of its volume.

Nuclear waste is soaked up by the spheres from solutions or suspensions. Then the "sponges" are fired at 2400°F, thus removing water. Simul-



Ceramic "sponges" offer promising method for packaging high-level liquid wastes. Since 300 "sponges" are needed to soak up five gallons of waste, the technique cannot compete economically with other methods of waste disposal except for concentrated high-level wastes

taneously, the pores are sealed and the waste trapped. The spheres then may be buried or even dumped at sea since salt water does not affect them. About 2" in diam, the spheres

### IDEAS



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### Three Deep-disposal Methods Promising

Three types of deep-disposal methods are being investigated by Oak Ridge National Laboratory scientists in cooperation with other groups and companies.

One of these, hydraulic fracturing, borrows a technique developed by the petroleum industry. This is a method for inducing narrow, sheet-like fractures between strata deep underground. The petroleum industry used it to stimulate the flow of oil to sluggish oil wells.

Nuclear scientists hope to be able to force thin sheets of wastes and cement mixtures (grout) out into impermeable shale. This technique seems to offer promise for disposal of moderate volumes of medium-level wastes.

Since 1955, the possibility of using natural rock salt caverns for the storage of radioactive waste has been under investigation.

Among the characteristics which make salt deposits attractive are: 1) impermeability to water, 2) high thermal conductivity and 3) structural strength. The last is such that cavities 100' high, 100' wide and 3000' long can be opened 700' below the ground and remain open without support of any kind. Compressive strength of salt is comparable to concrete while its high thermal conductivity means that heat generated by decay could be rapidly dissipated.

Storage of solid wastes in salt caverns is relatively simple and safe. However, scientists need to know more about the effects of liquid wastes in salt caverns before actual tests with radioactive materials can be undertaken.

Deep-well disposal is being considered as a likely means for disposal of low-level wastes. It is believed that this would permit the storage of large quantities of contaminated liquids below the water table and thus beyond the reach of circulating potable

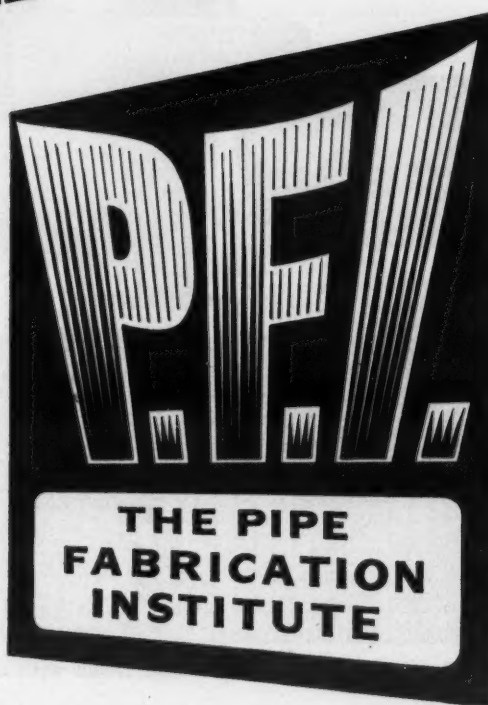
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Check 2273 opposite last page.

## IDEAS

water for the public's use.

A good well could be expected to accept on recharge a million gallons of water per day, much more than could be accommodated by several surface reservoirs.

However, the use of deep wells for high-level wastes has been vetoed due to the rate of heat dissipation. Concentrated quantities would cause a dangerous rise in temperature.

At present, a site is being sought for drilling a well in which actual low-level radioactive materials can be test-stored.

The three deep-disposal techniques are currently considered supplementary: Hydrofracture for medium-level wastes, deep wells for low-level wastes and natural rock salt disposal for small packages of high-level wastes.

### Another 'Solution'

A late entry in the nuclear waste disposal derby is offered by General Electric, operator of the AEC's Hanford, Wash., plant. GE has found that chemically combining radioactive wastes with minerals offers a simple and flexible waste storage method. This technique appears practical for some low or intermediate level wastes and shows promise for treating highly radioactive wastes containing  $\text{Sr}^{90}$  and  $\text{Ce}^{137}$ .

Two basic chemical reactions, mineral replacement and mineral adsorption, are employed.

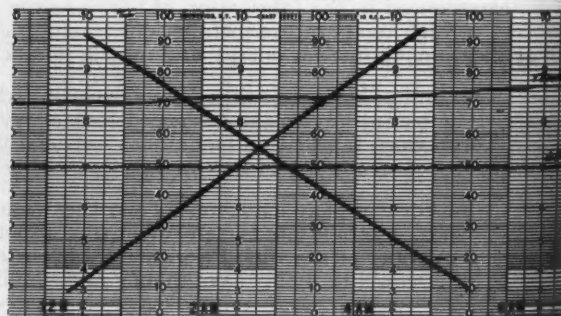
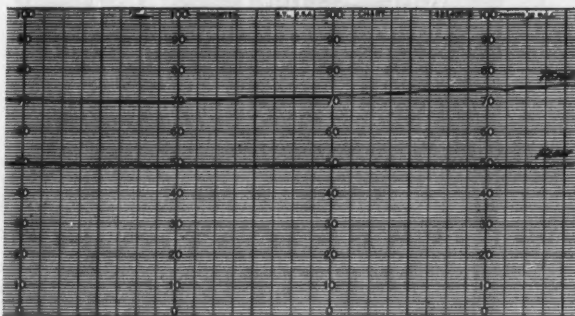
GE scientists have utilized calcium compounds, ordinary limestone and clay-like clinoptilolite in tests. Wastes could be stored in artificial beds of such minerals, ground sand-fine, and sunk in the ground at the burial site.

Likely to prove useful in conjunction with salt disposal is the technique of pot calcination under development for the past two years at Oak Ridge.

This is a method for reducing high-level liquid wastes to ceramic materials. It consists of evaporation to dryness and calcination of residual solids in a stainless-steel pot



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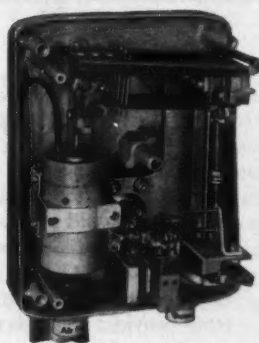
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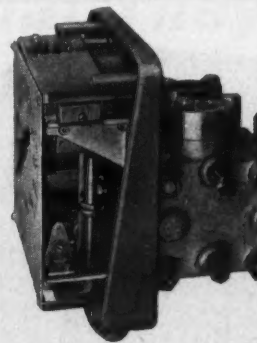
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Open case design provides free access for maintenance.



Diagonally split case gives easy access for all adjustments.

by heating to 900°C. This forms a radioactive ceramic which is immobilized inside the casing.

Waste so encased can be readily handled for shipping and, of course, is amenable to storage in salt caverns.

This just about sums up the principal routes being explored in the search for a final, permanent method of nuclear waste disposal. There are a number of side streets being investigated, but these deal primarily with the problems of reducing the quantity of waste and changing it from liquid to solid forms.

One promising development is a nuclear-waste evaporator, the size of a home furnace. Designed by General American Transportation Corporation for use with The Martin Company's PM-1 (portable medium-power-range nuclear plant), the evaporator reduces liquid waste to a small fraction of its original volume.

A 500-gallon storage tank is expected to be adequate for handling (after evaporation) the waste produced by the PM-1 over a period of 10 to 20 years. ■

### Quick-opening closure bypasses usual bolts

Need for bolts in closures on such equipment as autoclaves, condensers, environmental chambers, spray columns, pressure vessels and vacuum tanks is eliminated with quick-opening closure which operates through the use of encircling wires attached to tapered pins.

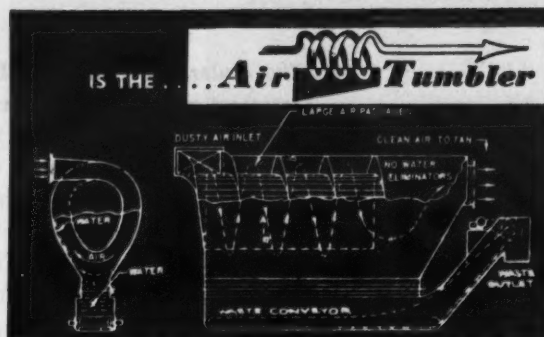
Motion of a handle draws together the wire and exerts an inward pressure on the pin, sealing the cover plate to the neck flange in a wedge-like position. This process takes less than 1 sec. The cover is removed just as fast merely by releasing the handle. Pre-loaded springs release the tapered pins in an outward position.

(Preco quick-opening closure is a development of Process Equipment Corp., Lodi, N.J.)

Check 2275 opposite last page.

Check 2274 opposite last page.

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► A NEW SOLUTIONS ARTICLE  
**Dewatering breakthrough makes high-density pulp bleaching feasible**

**Problem:** Since March 1953, St. Regis Paper Company and Becco Chemical Division of FMC Corporation have been collaborating on efforts to develop a commercially feasible method of bleaching high-density groundwood pulp.

At the Deferiet, N.Y., mill of St. Regis, bleaching of groundwood and sulfite pulps was conducted using the "pot test" method.

High-density pulp, so processed, proved to be significantly brighter than moderate-density pulps bleached with the same amount of hydrogen peroxide. However, knots formed in the pulp during dewatering and were very difficult to break up.

Further development of the process appeared to be stymied by the inadequacy of the screw press in use.

**Solution:** A press manufacturer was invited to try to design a press to overcome this difficulty. The manufacturer adapted a screw press used in the food processing industry.

Following successful pilot-scale tests, a commercial-scale 120 ton/day plant was built and completed in March 1960.

### Three Presses Used

At Deferiet, deckered groundwood (at 4% air dry consistency), is first metered to a vacuum thickener which raises it to a consistency of 12-14%. It is then conveyed to the bottom of one of a battery of three vertical screw presses.

Each press consists of a tapered spindle surrounded by an ascending "thread" with interrupted flights, mounted inside a cylindrical screen frame. As the spindle rotates, the upward pitch of the spiral screw carries the pulp upward through an increasingly smaller gap between the spindle and screen.

Compression on the pulp increases gradually as the material rises, so that it reaches

## SPRAY NOZZLES

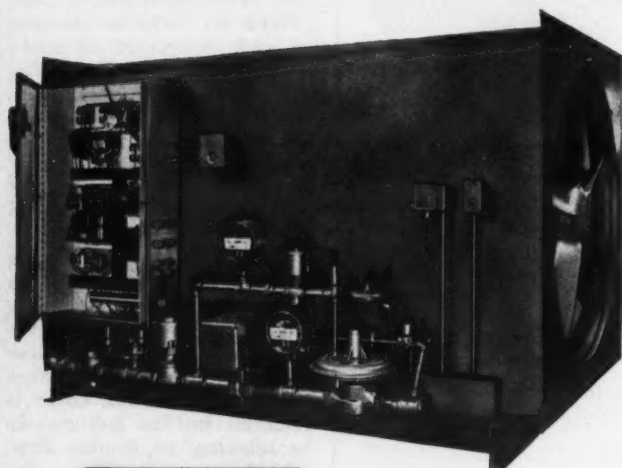
Spray nozzles come in a great variety of types and sizes. In fact, Spraying Systems offers a choice of over 14,000 of them... to give you performance characteristics to meet each need exactly. For information on the scope of the Spraying Systems product line, write for Catalog 24... a forty-eight page reference manual.



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the discharge point atop the press at a consistency of 30% or higher. Stationary horizontal breaker bars project radially into the pressing space from the inner surface of the pressing cylinder to prevent the pulp from merely rotating with the screw. The outer pressure cone, which surrounds the spindle, rotates with it. This prevents the pulp fibers from rolling and thus forming objectionable knots.

#### Resaturation Prevented

White water squeezed from the pulp, passes out through a screen and downward into a collecting pan at the bottom of the press. This prevents resaturation.

An hydraulically-controlled density-regulating device maintains uniform consistency of discharged pulp.

The compressed pulp is carried by horizontal screw conveyor to a mixer where the bleaching liquor is mixed with the pulp, reducing the density to approximately 25% air dry. No steam is normally required. From the mixer, the saturated pulp is discharged into a retention tower where bleaching occurs in  $\frac{1}{2}$  to two hours.

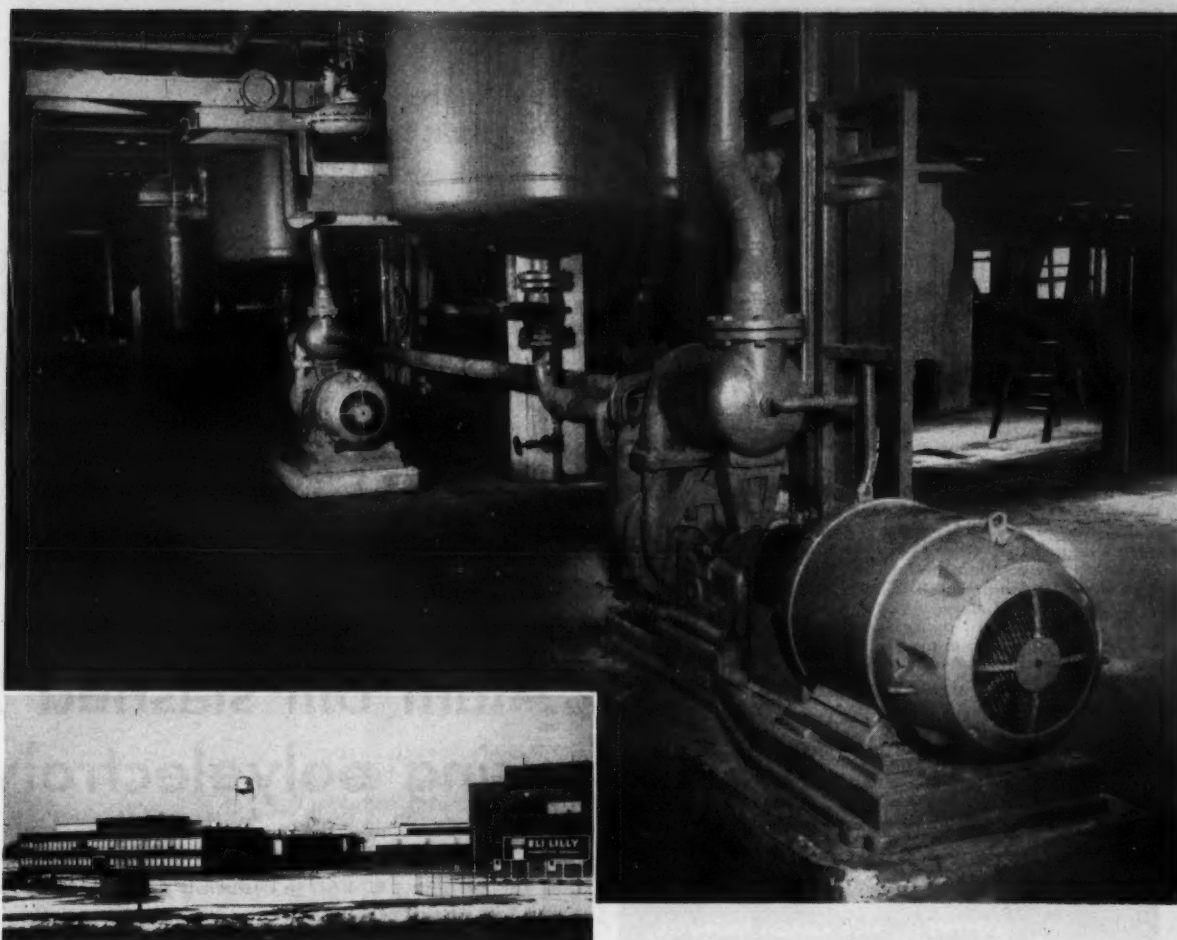
After bleaching, the pulp is diluted to a density of 8 to 9% inside the tower and then removed to a neutralizing chest where liquid sulfur dioxide is added. The pulp is then pumped to a storage tank at a consistency of 4% where it is held ready for use in the beater room.

**Results:** The modified vertical screw presses eliminated the problem of knots and dewatered the pulp to the desired consistency.

St. Regis gets more bleaching action with less chemical consumption. In addition, the process requires no steam; water consumption is lower, holding times are shorter; and less plant area is needed per ton of pulp produced.

(FMC vertical screw press for dewatering pulp was developed by Canning Machinery Division, FMC Corporation, 161 E. 42nd St., New York 17, N.Y.)

Check 2279 opposite last page.



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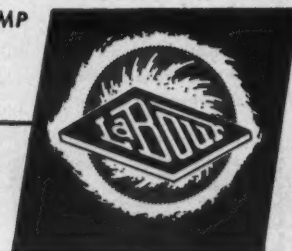
was begun, and then when facilities were expanded some four years later, they put in fourteen more.

Men who have had actual experience with LaBour service and dependability almost invariably specify LaBours for expansion or replacement. If you haven't had the opportunity to see LaBours in operation on a tough job, write us for facts you ought to know about LaBour performance.

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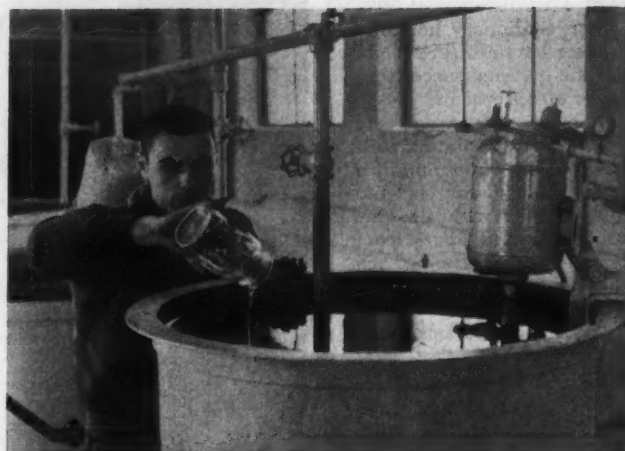
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## IDEAS

Coagulant aid is added to mixing tank at rate of two quarts per day to treat 1.5 million gpd of water



# Alum bill slashed 53% using polyelectrolyte

**Aid makes a little coagulant go a long way in reducing process water color content**

**Problem:** Water clarity, essential for processing pastel-colored fabrics, was being achieved, but chemical-treatment costs were mounting steadily for Ware Industries. This company owns and operates several large buildings at Ware, Mass., supplying power, steam and process water to such tenants as Ware Woolen Co., Hampshire Woolen Co., Baypath Textiles, Inc. and Ware Knitters.

Water is drawn from the Ware River, which travels about 30 miles, passing several industrial plants before it reaches Ware, Mass. Heavy run-off from fields and forests, coupled with the industrial effluent, raises color values up to 80-90 ppm. Color content averages 50-60 ppm.

This color content had to be reduced to less than five ppm for the Ware tenants who processed pastel-colored fabrics. Since these colors require only a small amount of dye, the process color content must be kept as close to zero as possible to avoid off-shades or spotting.

In addition to chlorinating, Ware Industries was adding up to 1400 lb/day of alum and some caustic soda to the water.

**Solution:** Attempting to improve coagulation at reduced cost in the 50' settling basin, Milton H. Radcliff, Ware president, experimented with several coagulant aids.

Among these was a viscous liquid polyelectrolyte which readily dissolves in water. This coagulant aid adheres, by adsorption, to suspended particles, floc or precipitates in a water stream, extending charged "tails." When two or more treated particles meet, the "tails" bind them together. This speeds up the rate of floc formation, resulting in higher sedimentation rates. The polyelectrolyte thus steps up the coagulating activity of the alum, making a little coagulant go a long way.

Ware uses two quarts per day for an average water flow of 1.5 million gpd.

**Results:** Alum requirements have been reduced from 1400 lb/day to 600 lb/day, a 53% saving which trims \$768 per month from Ware's water-treatment bill. Color content of process water is reduced to less than five ppm.

Before the coagulant was adopted, Ware was nearing the capacity of its plant to meet color-removal requirements. Now, the company feels that, without any equipment investment, clear water output could be substantially increased.

(Coagulant Aid 323 is a product of Hagan Chemicals & Controls, Inc., Hagan Center, Pittsburgh 30, Pa.)

Check 2283 opposite last page.



#### Aerosol development

...gets push from simple, low-cost kit to test formulations for foams and sprays. Stability, corrosiveness, changes during storage, etc., can be observed with transparent aerosol bombs. Interchangeable tips allow study of spray patterns.

Kit contains clear plastic coated glass bottles, valves, tips, pressure gage and propellants. Nitrogen, carbon dioxide, fluorocarbons, butane and other propellants are available.

(Visual test kit 600 D is a product of Pressure Pak, Inc., 420 Monceaux Road, West Palm Beach, Florida.)

Check 2284 opposite last page.

#### Wiring breakthrough cuts size, weight and costs

A method of wiring which consists of custom-etched designs of thin, flat conductors permanently bonded between and to flexible sheets of insulation, is hailed as a breakthrough in wiring technology.

The method may be used in place of a group of separate wires bundled or twisted together in a cable.

The wiring system is expected to give reductions in size up to 60% and weight up to 40%. In comparison with conventional wiring, installation costs are expected to be halved.

(Flexprint wiring is a development of Sanders Associates, Inc., 95 Canal St., Nashua, New Hampshire.)

Check 2285 opposite last page.

## At a practical cost, Heavy-duty Nickel Plating protects product purity in many applications

A heavy plated coating of Nickel forms a durable, corrosion-resisting "wall" between basis metals and chemicals that must stay pure. Often—where solid corrosion-resisting materials aren't needed—Heavy-duty Nickel Plating is the most economical way to protect purity and minimize equipment maintenance.

Phenols remain free of color contamination in steel tank cars lined with Heavy-duty Nickel Plating. The car below is one of ten in use by California Chemical Company, Oronite Division. This car fleet—built from Nickel-coated steel plate produced by Bart Manufacturing Corp., Newark, N. J.—was ordered after tests made in 1955. The car originally tested is still delivering pure phenol, and has paid for itself many times over.

## PREVENTS CONTAMINATION BY THE CARLOAD

Where can you profit from this practical way of minimizing corrosion and preventing contamination?

Heavy-duty Nickel Plating is as versatile as it is effective. It can be applied before or after fabrication, on simple or complex shapes. Existing equipment can be upgraded—and get a new lease on life—when critical areas are plated with

Nickel. And many electroplaters will supply steel in several useful mill forms, uniformly preplated with a layer of Nickel.

Find out the cost-saving possibilities in the detailed 20-page booklet *Industrial Nickel Plating*. It includes case histories...test results...a table of corrosion-resistance ratings...specific facts on Heavy-duty Nickel Plating in contact with 53 corrosive media. A copy is yours for the asking.

## INCO NICKEL

THE INTERNATIONAL NICKEL COMPANY, INC.

67 Wall Street



New York 5, N. Y.



Check 2286 opposite last page.

BALL JOINTS—  
new,  
lighter  
weight,  
flexible—



SIZES: 3", 4", 6", 8", 10", 12"

for **CRYOGENIC** piping

**FOR PROJECT REQUIREMENTS**—In handling fluid fuels and oxidizers, including liquid oxygen. Also in industrial cryogenics for liquid methane and liquid propane or butane at low, as well as ambient, temperatures.

**RECOMMENDED SERVICE**—(1) Fluid loading arms. (2) Expansion Joints. (3) Gimbal/Rotary Swivel motion. (4) Shock resistant flexible piping.

**NEW, ADVANCED DESIGN**—Has passed official "Qualification Tests," including shock tests of more than 100G's. **TEMPERATURES:** -320°F to +275°F. **PRESSURE RATING:** Designed for and qualification tested at 200 psi operating, 300 psi proof, 700 psi burst pressures. Ask for Bulletin 233 B. BARCO MANUFACTURING CO., 537N Hough St., Barrington, Illinois.

**1st** for **SAFETY**

**BARCO**

Check 2287 opposite last page.

Answers  
to hose line  
problems of  
**FLEXING**  
**HEAT**  
**PRESSURE**

Aeroquip  
Hose of Teflon  
and Reusable  
"super gem"  
Fittings\*

Where flexing, heat and pressure are problems, Aeroquip Hose of Teflon and Reusable "super gem" Fittings provide answers. Aeroquip Hose of Teflon, lightweight and flexible, has long service life even under constant flexing, and with steam temperatures to 388 degrees and pressure up to 1500 psi. Contact your local Aeroquip distributor. Write for full information: Bulletin IEB-50.



\*U.S. Patent Nos. 2,833,567 and 2,731,279. "super gem" is an Aeroquip Trademark. Teflon is DuPont's trade name for its tetrafluoroethylene resin. Aeroquip products are protected by patents in U.S.A., Canada and Abroad.

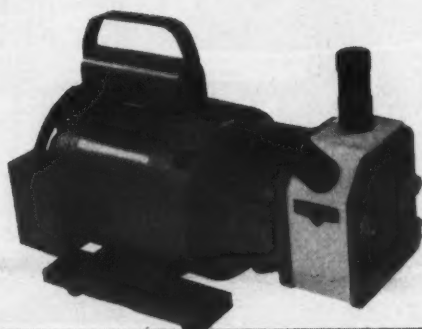
**Aeroquip**

Aeroquip Corporation, Jackson, Michigan  
INDUSTRIAL DIVISION  
INDUSTRIAL PLANTS: Van Wert, Ohio.  
Burbank, Calif.; Dallas, Texas;  
Portland, Oregon; Cranbury, New Jersey  
In Canada: Aeroquip (Canada) Ltd., Toronto 19, Ont.  
In Germany: Aeroquip G.m.b.H., Baden, Baden-Dg.

Check 2288 opposite last page.

**ONLY  
VANTON  
SEALLESS  
PLASTIC  
PUMPS**

have all these exclusive features:



- No Shaft Seals —  
No Stuffing Boxes
- Self-Priming —  
Non-Agitating
- Non-Contaminating
- Do not leak
- Operate dry or wet
- Handle corrosive chemicals,  
gases and slurries with  
equal ease
- Capacity range to 40 GPM
- Temperature range from  
- 60°F. to + 350°F.
- 54 combinations of materials  
such as Teflon, PVC, Kel F,  
Hypalon and Neoprene

WRITE FOR CATALOG #10

**VANTON**

**PUMP AND EQUIPMENT CORP.**  
DIVISION OF COOPER ALLOY CORPORATION  
HILLSIDE, NEW JERSEY



Check 2289 opposite last page.

## IDEAS

**Superconductive magnets,  
using no power, may  
be available soon**

Technique to mass-produce  
niobium-tin developed

A simple chemical method for growing crystalline niobium-tin is expected to pave the way for widespread use of simple superconductive magnets, which use no power, but generate enormous magnetic fields.

Magnetic properties of niobium-tin have long been known, but development has been stymied by lack of a technique for mass-producing this material, a difficulty eliminated by the new method. Magnets made with the material will operate indefinitely without consuming any power other than the small initial voltage needed to start the current flowing through the material.

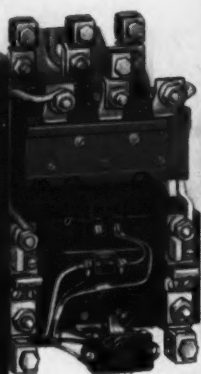
Tests on short-wire length indicate that the wire remains superconductive in 94,000 gauss magnetic fields, while supporting a current of 7 amp. This represents a current density in the superconductive coating of 100,000 amp/sq cm. It is expected that a niobium-tin wire-wound magnet weighing only about 20 lb (exclusive of refrigeration equipment) and started with a pulse from 6-v battery, will produce a magnetic field over a volume that now requires a 100-ton electromagnet operated continuously by a 100-kw power supply.

Laboratory apparatus is now in use which can produce uniform crystal coatings of niobium-tin on a fine wire at the rate of 30 ft/hr.

(Technique for mass-producing crystalline niobium-tin is a development of Radio Corporation of America, 30 Rockefeller Plaza, New York 20, New York.)

For more information on developments reported in this section, check corresponding numbers on Reader Service Slip opposite last page.

You cannot afford to ignore  
the New Allen-Bradley  
BULLETIN 709 Starter Line



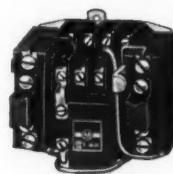
SIZE 00 1½ HP, 220 V 2 HP, 440-550 V	SIZE 0 3 HP, 220 V 5 HP, 440-550 V	SIZE 1 7½ HP, 220 V 10 HP, 440-550 V	SIZE 2 15 HP, 220 V 25 HP, 440-550 V	SIZE 3 30 HP, 220 V 50 HP, 440-550 V	SIZE 4 50 HP, 220 V 100 HP, 440-550 V	SIZE 5 100 HP, 220 V 200 HP, 440-550 V
--	--	--	--	--	---	--

## They OUTPERFORM and OUTLAST ALL Others

These new Allen-Bradley starters bring you the greatest advance in reliability and life in all motor control history. Also, they possess a compactness that's almost unbelievable—especially in the higher ratings.

The new Bulletin 709 solenoid starters feature a patented, high-efficiency magnet, which is cushioned to reduce shock and wear. Contacts are of weld-resistant cadmium oxide silver. All coils are "pressure

molded" for protection against physical damage and destructive atmospheres. The two or three solderpot overload relays are trip-free and tamperproof. Brooks Stevens, famous industrial designer, has given the new enclosures a styling that adds "eye appeal" to every installation. To get full details, contained in Publication 6100, please write today to: Allen-Bradley Co., 1316 S. Second Street, Milwaukee 4, Wisconsin.



### SIZE 00 NOW AVAILABLE

Provides the same long life and reliability as others in the Bulletin 709 family. Rated 1½ HP, 220 V; 2 HP, 440-550 V.

15-61-MR

# ALLEN-BRADLEY

Member of NEMA

QUALITY  
MOTOR CONTROL

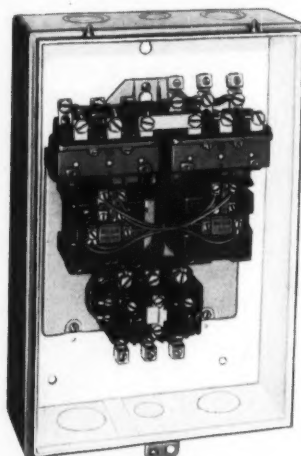
# Here Your Motor Starter Dollar Buys **MORE OF THE QUALITIES YOU NEED**

Where else could you possibly obtain—in one complete line—all of the desirable features of the ideal motor control...

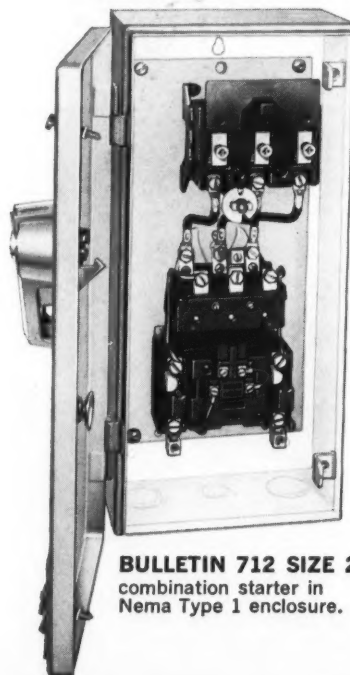
- |                                      |   |
|--------------------------------------|---|
| 1. Smaller size                      | 6. Simpler installation                             |
| 2. Greater reliability               | 7. Complete accessibility                           |
| 3. Remarkable switching capacity     | 8. Beautiful appearance—<br>either open or enclosed |
| 4. Longer life                       | 9. Surprising light weight                          |
| 5. Conscientious overload protection |   |

The heart of this new line of magnetic motor starters is the unique solenoid contactor. While it retains the famous A-B one-moving-part principle, it is completely new and far more efficient. This fact is reflected in reduced dimensions for all of these controls. Yet, this contactor design will perform reliably for many more *millions* of trouble free operations.

The new enclosures are very "eye appealing." When the open type starters are assembled into special panels, their neatness and compactness will delight the designers. Full details are in Publication 6100. Please write: Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.



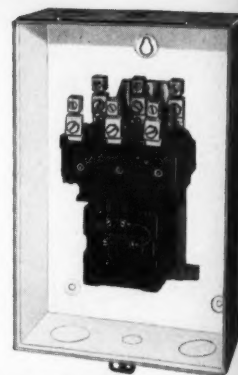
**BULLETIN 705 SIZE 2**  
across-the-line reversing starter  
and overload relays in Nema  
Type 1 enclosure.



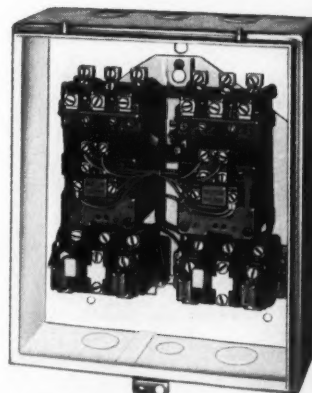
**BULLETIN 712 SIZE 2**  
combination starter in  
Nema Type 1 enclosure.



**BULLETIN 709 SIZE 3**  
across-the-line solenoid starter  
in Nema Type 1 enclosure.



**BULLETIN 702 SIZE 3**  
three-pole, a-c solenoid contactor  
in Nema Type 1 enclosure.



**BULLETIN 715 SIZE 1**  
across-the-line, two-speed  
starter—with two overload re-  
lays per speed—in Nema Type  
1 enclosure.



# ALLEN-BRADLEY

Member of NEMA

**QUALITY  
MOTOR CONTROL**

15-61-HR

**Hot knife blade bends  
for unusual applications**

**Uses:** Cutting and sealing rubber and plastics.

**Features:** For unusual shaping and sealing operations, the operator may bend or curve the knife blade to conform to the particular application. Knife operates on low voltage.

**Description:** Unit consists of low-voltage power supply with variable manual control, 12' length of rubber insulated cable, and blade of nickel-chromium ribbon stock, 4" long, 1" wide, 1/16" thick, fastened to a wooden handle.

Standard blade temp is 950° F, but temp can be increased by filing to less width or thickness, thus increasing resistance.

(Electric hot knife is described in Bul KH-1 available from Sta-Warm Electric Company, subsidiary of Wakefield Corporation, North Chestnut St., Ravenna, Ohio.)

Check 2290 opposite last page.

**NEW LITERATURE**  
Ideas and New Trends

**High-temp plastics** for rocket applications are asbestos mat, laminated with high-temp phenolic. Excellent machining qualities plus heat and ablation resistance are reported for Tylorlon PA in Bul 8.5. Better heat and ablation resistance are reported for PA-6 in Bul 8.4 — Taylor Fibre Co.

Check 2291 opposite last page.

**Plant sites** and other attractions to manufactures in Scranton, Pa., are displayed in 30-page brochure — Greater Scranton Chamber of Commerce.

Check 2292 opposite last page.

**Freeze-drying apparatus**, including a universal model incorporating a mechanical refrigeration unit in addition to a dry ice and alcohol condenser, a laboratory model, and a bench model, are described in Bul 2345 — American Instrument Co., Inc.

Check 2293 opposite last page.

For more information on product at left, specify 2294 . . . see information request blank opposite last page.



Grinnell-Saunders Straightway Valves\* on duty 3 years in pioneer bleach-liquor process.

In world's first continuous, automatic  
ORP controlled-reaction  $\text{Ca}(\text{OCL})_2$  process . . .

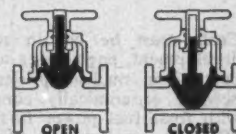
## Grinnell-Saunders Diaphragm Valves mark third year of trouble-free service

3 years ago, the world's first continuous, automatic semi-clarified calcium-hypochlorite process—using oxidation-reduction-potential control of reaction—went on stream at Crown Zellerbach's St. Helens, Ore. mill. Selected to control materials-flow in this pioneer installation: Grinnell-Saunders Diaphragm Valves.

Today, Crown Zellerbach reports that the Grinnell-Saunders Diaphragm Valves still give trouble-free service even after 3 years of handling highly-corrosive bleach-liquor!

Grinnell-Saunders Diaphragm Valves offer streamline flow — leak-tight closure — easy maintenance. Working parts are completely isolated from material in the line to prevent corrosion, abrasion, clogging. Wide choice of body, lining and diaphragm materials, too.

See how Grinnell-Saunders Diaphragm Valves can help your installation. Write or call Grinnell Co., Providence 1, Rhode Island.



## GRINNELL-SAUNDERS DIAPHRAGM VALVES

GRINNELL COMPANY, INC., PROVIDENCE 1, R. I. • BRANCH WAREHOUSES AND DISTRIBUTORS FROM COAST TO COAST  
PIPE FITTINGS • VALVES • PIPE HANGERS • PREFABRICATED PIPING • UNIT HEATERS • PIPING SPECIALTIES

Check 2295 opposite last page.

Sintered titanium parts as a low-cost solution to problems of modern design are considered in first issue of Materials Scope. Subsequent issues of news-letter will cover Scientific Materials Selection, Advanced Metals Applications, The New Field of Fiber Metallurgy, and Tungsten Deposits. Materials Scope — Mechanical Research Division, Clevite Corporation.

Check 2296 opposite last page.

Computer service that employs Project Evaluation and Review Techniques (PERT) and Critical Path Scheduling, is introduced in tech bulletin. Service, called Project Control Methods, is used to plan and evaluate what must be done to accomplish a complex project on time. Project Control Methods Bul — The Service Bureau Corporation, subsidiary of International Business Machines.

Check 2297 opposite last page.

Questions frequently asked by organizations and individuals engaged in nuclear science or in industrial work regarding the Access Permit Program are posed and answered in 12-page Bul TID-4558 (3rd Rev.) — Office of Technical Information Extension, U. S. Atomic Energy Commission.

Check 2298 opposite last page.

Production of pure nitrogen from nitric acid tail gas through a platinum metal catalytic process is detailed in Tech Bul II, 1 — Englehard Industries, Inc.

Check 2299 opposite last page.

Radiation monitoring services and evaluation and control methods used are described in eight-page Monitoring Bul — R. S. Landauer Jr. & Company.

Check 2300 opposite last page.

Water clarification equipment, which can be used to easily and economically expand existing plants or to trim 10 to 15% off the involved cost of a new facility, is described in Bul KL3501 — MicroFloc Corporation.

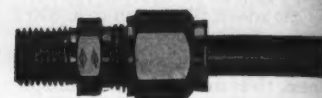
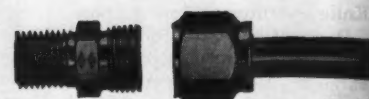
Check 2301 opposite last page.

Costs must be cut in research, development, engineering and production if nuclear power is to become economically competitive with fossil-fuel power in the next 10 years, concludes an AEC study of power plants, either in operation, under construction or planned. "Cost of Nuclear Power" (TID-8531) may be obtained for 50¢ from Office of Technical Services, U.S. Department of Commerce, Washington 25, D.C.

you can

see  
see  
see

when it's tight



no threads in sight  
when it's tight

With Hi-Seal you can see that hazards are not installed in your tubing system. When the threads no longer show, the connection is pressure-tight. No other fitting offers this advantage.

This means an easy, foolproof assembly that is inspected with just a glance. Anyone who can handle a wrench can make a dependable Hi-Seal joint every time. No need for assembler to count wrench turns. No over- or under-tightening to worry about.

Hi-Seal flareless assemblies are made faster, more economically, more surely. Specify Hi-Seal tube fittings.



BUTT JOINT

HI-SEAL

IMPERIAL EASTMAN

Imperial-Eastman Corporation General Offices: 6300 West Howard Street, Chicago 48, Illinois

IN CANADA: IMPERIAL-EASTMAN CORPORATION (CANADA) LTD. BARRIE, ONTARIO

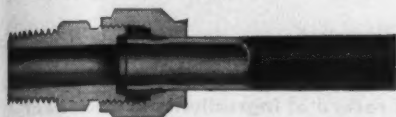
Check 2302 opposite last page.

CHEMICAL PROCESSING

# see

many reasons why  
you're ahead with HI-SEAL®

Seeing when they're tight is only one reason for preferring Hi-Seal fittings. Of course, this is a big one for fast, positive inspection and for design engineers who want leakproof, foolproof connections in any system.



**Withstand vibration, high pressure**—Hi-Seal fittings provide firm tube support for excellent vibration resistance. The fitting is a grip type, rather than a bite type. Three serrations in the sleeve establish the grip without damaging or weakening the tube.

When assembled, Hi-Seal fittings give you a pressure-tight seal compatible with the tubing required. For extreme pressure ranges, Braze-Seal fittings give make and break flexibility.

**Make and break 25 times**—Simple assembly and re-assembly of Hi-Seal butt-joint fittings mean greater re-use. Hi-Seal's standard is 25 re-uses. The industry standard is 15—or 66% more for Hi-Seal.

**Close bends**—Butt-joint Hi-Seal fittings make close bends possible. Reduce space, material by as much as a half!

**One fitting for entire system**—Hi-Seal is the most versatile fitting you can use. By standardizing on Hi-Seal, installation and maintenance men can plumb a job fast, yet perfectly, in any pressure range. Available in all styles and combinations, plus a variety of metals—steel, stainless steel, brass, aluminum, titanium, Monel, etc.

Now Imperial-Eastman meets all your fluid piping requirements—tube fittings, valves, couplings, flexible and rigid hydraulic lines, thermoplastic tubing, and tubing tools.

# FITTINGS

**IMPERIAL -  
EASTMAN**

DECEMBER 1961



processing and engineering data

316

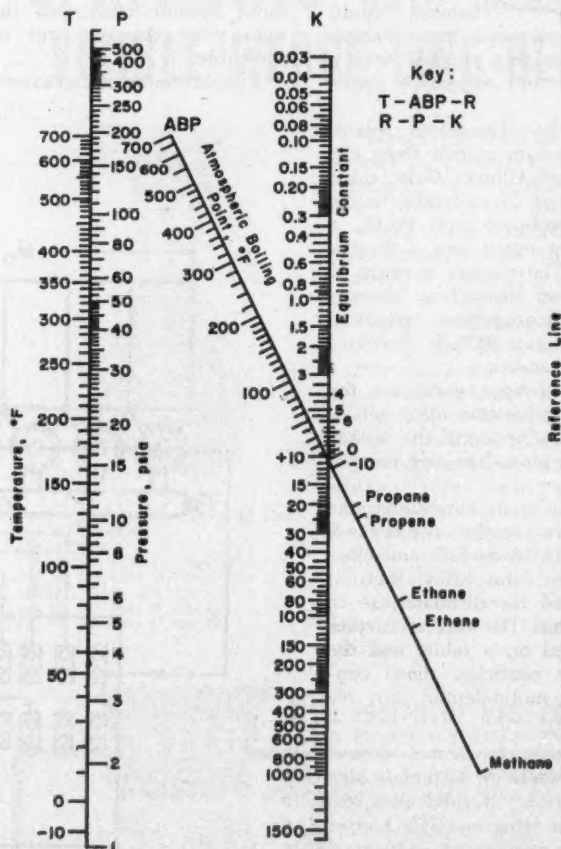
## Equilibrium Constants of Petroleum Fractions

GEORGE E. MAPSTONE

Johannesburg  
South Africa

Problems involving evaporation and/or condensation of petroleum frequently call for data for the equilibrium constants of petroleum fractions rather than for the data for individual hydrocarbons. The accompanying nomograph has been designed to provide the required information from the temperature, pressure and atmospheric boiling point of the fraction.

If the fraction is of a relatively narrow boiling range, it may be considered as a pure hydrocarbon and the boiling temperature at 760 mm accepted as the boiling point. For narrow boiling fractions the ASTM 50% point should be used, but when the distillation range exceeds 50°F, it is better to use the logarithmic mean of the ASTM 10% and 90% points.



©Putman Publishing Company 1961



# Ferro-moly melt rejects trimmed from 2% to 0.1%

Automatic bulk-weighing system provides Climax Molybdenum with precise formulation, plus printed record of ingredients in each heat

**Problem:** Between one and two batches of every 100 of ferro-molybdenum alloy processed at Climax Molybdenum Company's Langeloth, Pa., plant were rejected.

A  
NEW SOLUTIONS  
FEATURE

These reject batches could be re-processed, but crushing them for this purpose was a difficult and expensive operation.

At the Langeloth plant, molybdenum sulfide from the company's Climax, Colo., mine is roasted to molybdic oxide, then combined with  $\text{Fe}_3\text{O}_4$ , a reducing agent and a fluxing agent. The oxygen is replaced with iron through a "thermite" burning-type reaction, producing a 3000-lb "button," 4' in diameter.

Under proper conditions, the ferromolybdenum alloy settles to the underside of the button while a glass-like slag rises to the top.

Under such conditions, the two are easily separated. After size reduction and classification, the alloy then is packaged for ultimate use in foundries. The slag is further classified on a table, and the heavier particles, those containing molybdenum, are re-

turned to storage for recycling through a later heat.

Sometimes, however, the slag and alloy fail to separate in the button and the button must be rejected.

As the frequency of such rejections increased, management became convinced that mis-proportioning was responsible.

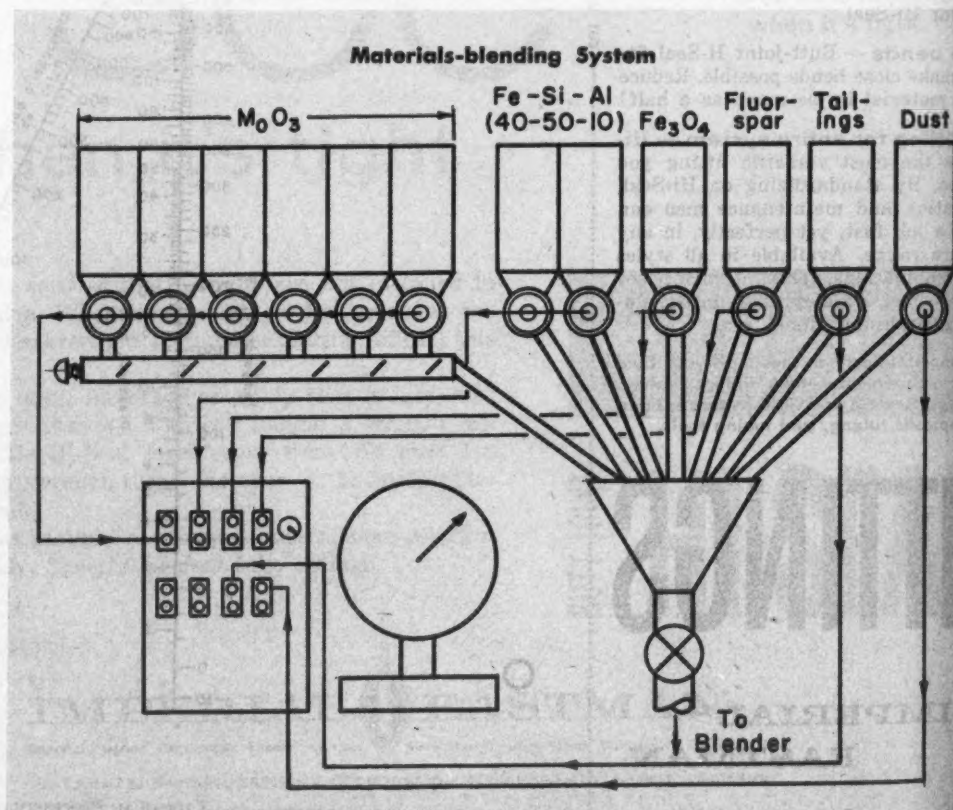
Proportioning of ingredients,

at that time, was manually controlled. The operator was guided by an instruction card, prepared for each batch by the laboratory on the basis of analyses of the raw materials.

The operator controlled (by holding down contact switches) the running time of screw-conveyor motor drives so as to deliver cumulatively to the scale hopper the precise

amounts of each ingredient making up the heat. When an operator was interrupted, the possibility arose that he might forget which ingredient had been added.

**Solution:** Automatic weighing systems were investigated and one selected which would utilize existing bins, ductwork and screw conveyors. Basically, the system consists of a



*Flowsheet of materials-blending section: Molybdenum oxide is fed from multiple hoppers by individual screw conveyors into central collection conveyor. Each ingredient-conveyor motor-drive is individually controlled as shown by lines*



Plant Manager Dave J. Errett (left) and Production Superintendent Fred Pope discuss controller settings on the weighing system at the Langeloth, Pa., plant

group of separate screw-conveyor motor-drive controllers—one for each ingredient plus two spares.

As was done under the old system, batches for heats are based on laboratory analyses of molybdenum content of  $\text{MoO}_3$ , iron content of the  $\text{Fe}_2\text{O}_3$ , Mo and Fe contents of the reclaimed slag and reject buttons. Specification data, furnished with ferrosilicon aluminum alloy, the reducing agent, and fluorspar, the fluxing agent, are also considered in formulating the batches.

This information is incorporated into a formula card which the production supervisor follows in setting the potentiometer dial on each controller. These are calibrated in cumulative pounds.

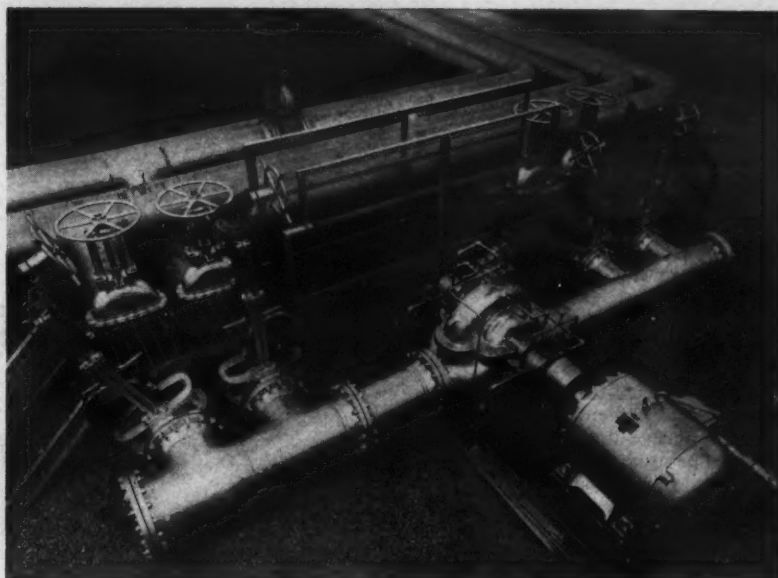
After the supervisor sets up the program, the operator presses a button which activates the controllers in scheduled sequence automatically.

When a sensing potentiometer on the weighing scale equals the resistance value of the potentiometer setting on the controller, that controller is cut off and a selector energizes the next controller in the sequence. A unique feature of the electronic cutoff control is a phase-sensitive amplifier that eliminates the adverse effects of plant voltage surges on electronic equipment.

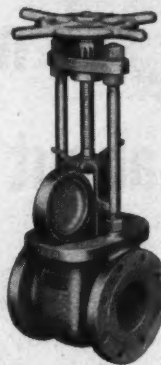
If the amount of an ingredient proportioned to the scale hopper deviates from the prescribed amount ( $\pm 5$ -lb system tolerance), the system stops, a light signals trouble and a tolerance meter indicates the amount of discrepancy for the specific ingredient.

To re-start the system, the production supervisor must insert his key into the unit and set one of the following alternate instructions:

1) Forget the error, if



## NO SPILLAGE...NO LINE SPREADING with **Hamer** VISIBLE WEDGE LINE BLIND VALVE



Visible Wedge Line Blind Valves are available in three types:

**STRAIGHTWAY**  
ASA 150 lbs. Sizes 1½" thru 18"  
ASA 300 lbs. Sizes 1½" thru 18"  
**VERTICAL ELBOW and TEE**  
ASA 150 lbs. Sizes 3" thru 12"  
ASA 300 lbs. Sizes 4" thru 12"

Where line spillage is intolerable or hazardous . . . where there is no space for line spreading, the HAMER Visible Wedge Line Blind Valve is the perfect installation.

Wedge type spectacle plates, pivoted on a yoke assembly and raised and lowered by a handwheel, seat and seal against stainless steel seats in the rigid body. The valve is opened or closed by raising the yoke assembly and switching the wedges. One wedge is always visible above the body to indicate from a distance whether valve is opened or closed.

Opening or blinding a line with the Visible Wedge Line Blind Valve is a one man operation requiring just a few minutes. Cost records from scores of users show you save 90% and more every time a line is blinded. Compare that with the cost of outmoded methods of line blinding and you can see why it pays to use Hamer Line Blind Valves.

Write for Hamer Catalog 60 for complete description of all types, sizes and pressure ratings.



**WELL EQUIPMENT MFG. CORP.**  
P. O. BOX 19485 • HOUSTON 24, TEXAS

HW-7-61



Division of CHIKSAN COMPANY  
a subsidiary of FMC CORPORATION



WECO  
UNIONS



CHIKSAN  
SWIVEL JOINTS



HAMER  
LINE BLIND VALVES



HAMER  
PLUG VALVES



WECO  
AIR-O-RING



WECO  
COMPOUNDS



WECO  
SNATCH BLOCKS

Check 2303 opposite last page.

minor, and proceed with the weighing of the remaining ingredients.

- 2) Add more ingredient if a short weight is indicated.
- 3) Add more of the preceding ingredients to compensate for the deviation if overweight is indicated.

The supervisor calculates the amount of adjustment necessary for the specific situation.

As each ingredient is added, the cumulative total at that point is printed into a record at the scale head that becomes part of the permanent records of the plant.

Should an electronic component fail, the cycle stops automatically and a signal indicates that the operation can be continued only by manual control.

**Results:** Button rejects have been reduced in frequency to about one in 1000 heats. In addition, the plant now has printed records of the ingredient composition of each batch. This enables the company to study the relationship between ingredient imbalance and imperfect buttons. It also provides a basis for research into more subtle quality variations.

Periodic maintenance of the system is handled by the plant electrical crew. Modular construction of the system permits removal of a malfunctioning assembly for return to the manufacturer for repair. The assembly removed can be replaced from the plant reserve supply.

(Automatic bulk weighing systems are a product of Toledo Scale, div. of Toledo Scale Corp., Toledo, Ohio.)

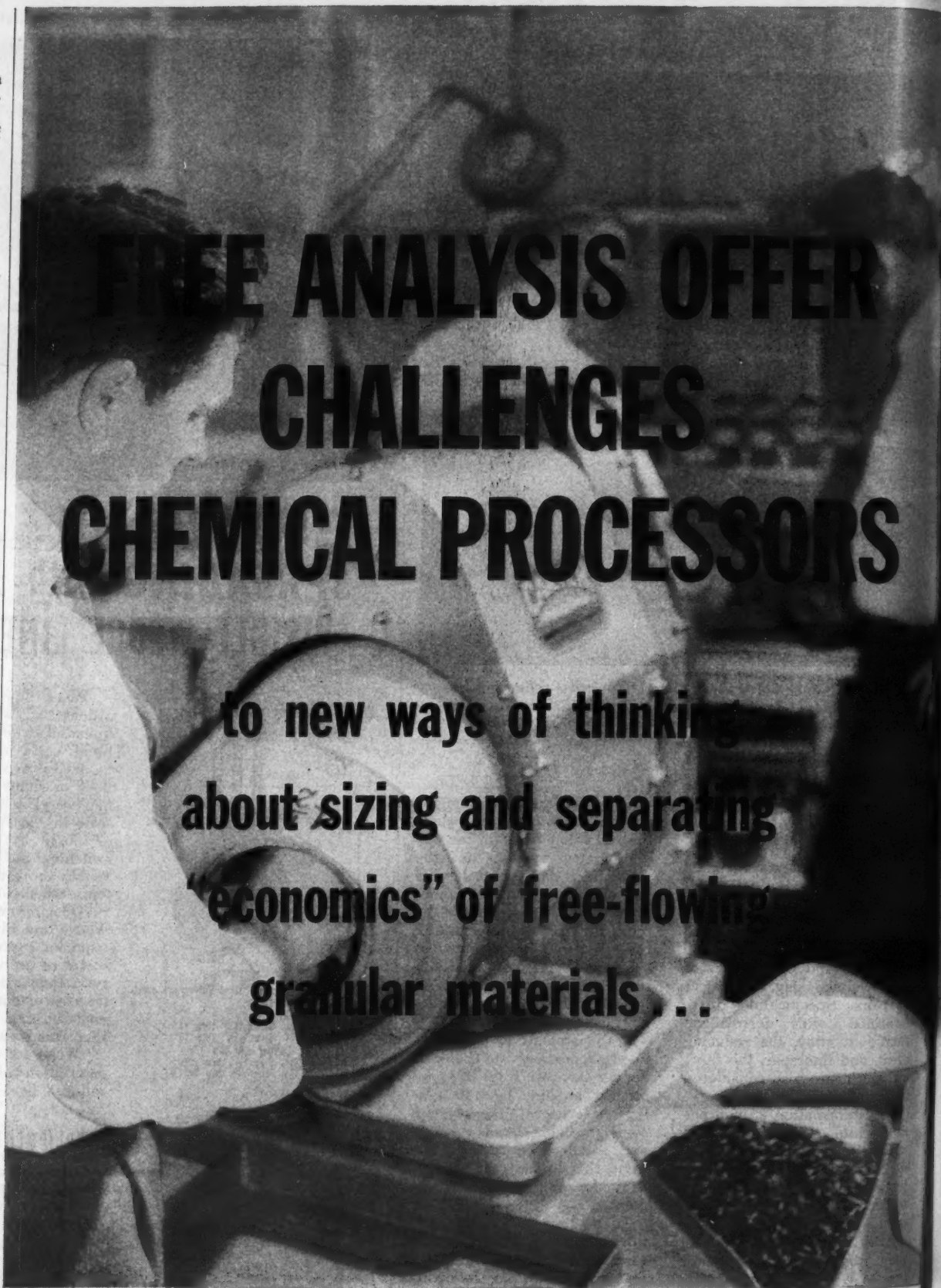
Check 2304 opposite last page.

#### NEXT MONTH

One packer replaces two at Kaiser Gypsum and one man fills more bags than could be filled on two machines. Bonus benefit is lower bag cost. For details, see this section next month.

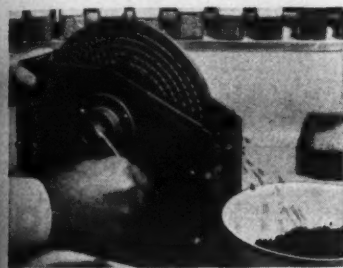
# FREE ANALYSIS OFFER CHALLENGES CHEMICAL PROCESSORS

to new ways of thinking  
about sizing and separating  
"economics" of free-flowing  
granular materials...



# SIMON-CARTER laboratory analysis shows how new rotary principle of separation provides profitable answers for processors!

This is your invitation to begin to enjoy the many advantages of a remarkable processing revolution that is under way in today's chemical industry. Radically different new sizing, separating techniques, made possible by the *rotary-motion* design of Simon-Carter machines, are revising cost figures throughout the industry. New S/C machines daily are delivering vastly increased production and efficiency—greater volume, accuracy and compactness, less maintenance—for today's processors.



This small hand-driven Disc Separator model enables Simon-Carter technicians to duplicate length separations in miniature with only a small material sample supplied by the processor.

Your key to these benefits: a remarkable free offer now being made to the chemical industry by Simon-Carter. It is this: Our expert technicians and completely equipped laboratory will undertake a complete analysis of your sizing and separating problems! This is a *free* service and our detailed recommendations impose no obligations. We will analyze separations by width, thickness, length, all types of sizing requirements; rough, fine, mechanical or by air, pneumatic conveying possibilities, dewatering—much more! Our entire laboratory is at your disposal!

Every month finds more compact, rotary Simon-Carter machines turning out impressive production records in the chemical industry. But we make our unique offer because we want *all* processors to know what significant "economies" rotary action can produce!

Do you have a problem removing agglomerates? Analysis may show



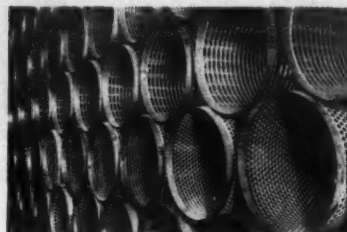
The material to be separated or sized is carefully examined under magnification to better fit tests and equipment to the problem.

that the Simon-Carter Scalperator can solve it. The *rotary* action of its scalping reel can handle up to 30,000 lbs. per hour. The Simon-Carter Laboratory can test your material samples on many different reel perforations and 5 different capacity models to match your needs!

Or do you have a length separating problem? Simon-Carter technicians use test equipment that duplicates the *rotary* motion of the Simon-Carter Disc Separator. Rotating discs, each with thousands of precisely formed tiny pockets, select or reject materials by length with uncanny accuracy! We will experiment with different disc pocket sizes, operating speeds, output volumes, etc., to exactly fit your requirements!

Another important series of tests

involve *width* and *thickness* sizing. The Simon-Carter Precision Grader does these jobs. We can duplicate its action on test equipment—experiment with up to 80 different cylinder perforations for you! There are many other tests and many other Simon-Carter machines like the Duo Aspirator, Sonic Conveying System and Spin-Away Centrifugal Dryer, that can be applied to solve your particular problems.



These are some of 80 different cylinders, each with different size perforations, that Simon-Carter can choose from to solve your width or thickness separating problems.

In addition to laboratory tests, Simon-Carter engineers will recommend ways to streamline *all* your separating and sizing functions—improve not just one processing step but the whole system! Through Simon-Carter's *free* analysis offer you can take a long stride forward in efficiency! Send in the coupon below for details today!



## SIMON-CARTER CO.

677 19TH AVE. N.E., MINNEAPOLIS 18, MINN.

Please send me more information on the Simon-Carter free analysis offer. I am interested in its application to our separating and sizing procedures. I understand that the free analysis offered by Simon-Carter imposes no obligation on myself or my firm.

NAME \_\_\_\_\_

COMPANY \_\_\_\_\_ TITLE \_\_\_\_\_

STREET \_\_\_\_\_

CITY \_\_\_\_\_ STATE \_\_\_\_\_

Check 2305 opposite last page.

## HANDLING & PACKAGING

### Versatility of conveyor hiked by switch units

Uses: Switching conveyorized items onto spur lines left, right, or straight ahead.

Features: Units connect to gravity or power conveyors and are operated by hand, or by motor from remote locations. Models are available for 3-way, "Y" or spur switching.

Description: Three-way switch model will divert material from a common carrier 45° left, right or straight through. Material also can be channeled from three lines onto a common line. The "Y" switch diverts material to right and left spur lines only. Spur switch model has straight-through and either right- or left-hand position turn.

Flexible roller curve units are for 12", 18", or 24" conveyors. Units are designed with rollers in two lanes to assure material alignment around curves. Rollers may also be pitched to aid in gravity flow.

(Data, including dimensional drawings, on Rapistan switch units may be obtained from The Rapids-Standard Company, Inc., Rapistan Bldg., Grand Rapids, Mich.)

Check 2306 opposite last page.

### Portable vibrator unloads car from one location

Uses: Vibrating hopper cars to unload such difficult materials as wet sand, rock phosphate, cement, gravel, coal, and ore.

Features: At 3000 rpm, vibrator produces an unbalance force of 6,600 lb. It is hand-portable, weighing 77 lb.

Description: Hopper-car vibrator is self-contained, gasoline-operated and develops a force sufficient to unload an entire car from one location, without manual assistance. Built-in mounting clamp can be securely attached to any rigid angle.

(Big Shake CCVG-3000 vibrator is being introduced by Martin Engineering Company, Neponset, Ill.)

Check 2337 opposite last page.

## LARGE CHEMICAL PLANT REDUCES LABOR COSTS \$80,000 WITH 4 OF THESE MACHINES!



### MILLER AUTOMATIC BAG PALLETIZER

This completely automatic, operatorless unit is specifically engineered to slash production costs in two- and three-shift plants. One large chemical plant replaced 16 men and saved \$80,000 annually by installing 4 of these palletizers!

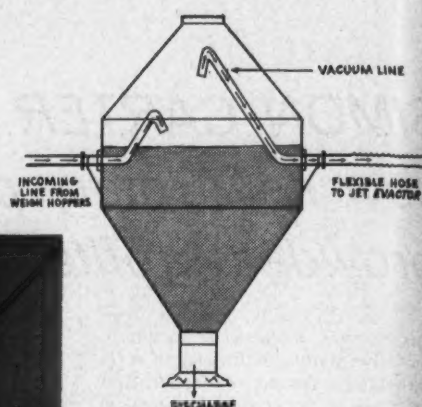
While you're thinking about it, write for bulletin describing operation of the Miller Automatic Palletizer!

### MILLER ENGINEERING CORPORATION

119-B East Barbee Avenue  
Louisville, Kentucky

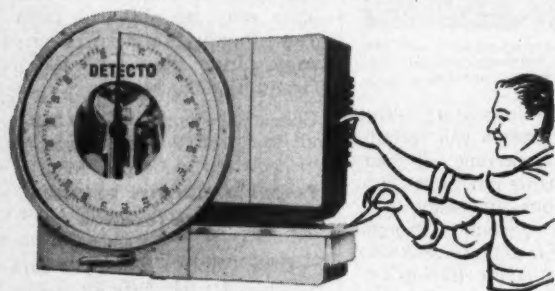
Check 2308 opposite last page.

## MATERIAL HANDLING and PACKAGING



Schematic of cone blender shows arrangements of internal piping

Jet-vacuum system (close-up) is connected to double-cone blender through journal



**PUSH** the button -  
manually or automatically...

**PRINT** the weight

## DETECTO SCALES

do it speedily... accurately.

Find out how Detecto can streamline your plant operation. Write to...

**DETECTO SCALES, INC.**

Dept. J-6, 540 Park Ave., Brooklyn 5, N.Y.

Check 2309 opposite last page.

## R<sub>x</sub> for blender loading - jet-vacuum system

Fills space, speed, cleanout needs  
of pharmaceutical firm

By **WALTER SCHULTZE**

Director of Engineering  
Bristol-Myers Products Division  
Hillside, N.J.

**Problem:** Finding a way to load speedily a 6000-lb double-cone blender with free-flowing powder materials was balking efforts to get into production with an improved product.

### A NEW SOLUTIONS FEATURE

The product was a new type of Sal Hepatica and the problem was dogging operating management of the Hillside, N.J., plant, Bristol-Myers Products Division, Bristol-Myers Co.

Involved were phosphate powder and a fused base. In the process, these were delivered to two scale hoppers on the floor below the big blender.

The question was: How to get the powder materials from the hoppers to the blender? Space, speed and cleanout were the primary considerations.

If the scale hoppers were not quickly and completely cleaned out to zero weight, residual material would tend to harden and eventually dislodge as cake. The cake would complicate future processing.

The space consideration ruled out most material handling methods considered. These would have necessitated conveying through the floor above the blender in order to load the blender through the

top. Standard pneumatic systems would have required too much head room and, in addition, a cyclone with attendant losses to the atmosphere.

**Solution:** A single-stage jet-vacuum system was installed. The compact unit weighs about 90 lb and requires approximately 300 lb/hr of 150-psi dry steam (97% quality or better) to operate.

At the Hillside plant, the jet-vacuum system is put into operation when the two scales



Free-flowing powders are carried from phosphate hopper at right, fused base hopper at left, to floor above and through journal into blender

register pre-set weights for the fused base and the phosphate. A flexible hose from the jet is connected through the journal of the blender to the exhaust opening in the blender. The weigh hoppers are connected directly to the blender's entrance port through the journal on the other side.

The jet produces 25" of vacuum in a closed system. Approximately 15" of vacuum is maintained in the blender and the lines to the weigh hoppers during loading.

When the proper vacuum is reached, a ball valve opens and the material from the weigh hopper is carried into the blender.

After blending, the material is dropped into storage hoppers on the floor below.

**Results:** In use for approximately a year, the jet system

## PAYLOADER®

16-YEAR  
PAYLOADER  
USER



## "This is a real production loader"

For 73 Years the Wilmington Fertilizer Co. has produced chemical fertilizers to serve an agricultural area within a 125-mile radius of Wilmington, N. Car. As one of the area's leading producers, the company uses 9 PAYLOADER tractor-shovels to handle incoming materials from boxcars, and in mixing and bagging operations.

*"We have used PAYLOADER tractor-shovels since 1945," says Plant Supt. George Sloan, Jr. "The first replacement with a Model H-25 was made early in 1960. The second in spring, 1961. This is a real production loader—it's fast, has large load capacity and excellent maneuverability, especially in the close bin and alley areas. It has given us production increases up to 50% over the smaller loaders."*

Moving Materials to the Mixer on a 125-ft. haul, the Model H-25 with its 2,500-lb. operating capacity can average handling 50 tons an hour. Another H-25, working on a 100-ft. delivery haul, supplies a bagging

machine rated at 60 tons per hour. "Our PAYLOADER equipment," states Mr. Sloan, "gives us such advantages as proved dependability, long machine life and proved efficiency in handling materials."

Credit this Fine Production Performance to the H-25's superior basic design: it combines a 2,500-lb. operating capacity with power-shift transmission and matching torque converter, power-transfer differential, power steering and a short 6-ft. turning radius. The H-25 also is "extra protected" against costly downtime with special air and oil filters, self-adjusting hydraulic brakes, and special oil and grease seals on all vital pivot points.

Your Hough Distributor wants to show you what a "real production loader" like the H-25 or larger PAYLOADER model can do in handling your bulk materials. Ask him for a demonstration or return the coupon for additional information.

# HOUGH®



THE FRANK G. HOUGH CO.  
LIBERTYVILLE, ILLINOIS



SUBSIDIARY - INTERNATIONAL HARVESTER COMPANY

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THE FRANK G. HOUGH CO., 744 Sunnyside Ave., Libertyville, Ill. 12-A-3

Send "Industrial  
Material Handling  
from A to Z"

NAME \_\_\_\_\_

TITLE \_\_\_\_\_

COMPANY \_\_\_\_\_

STREET \_\_\_\_\_

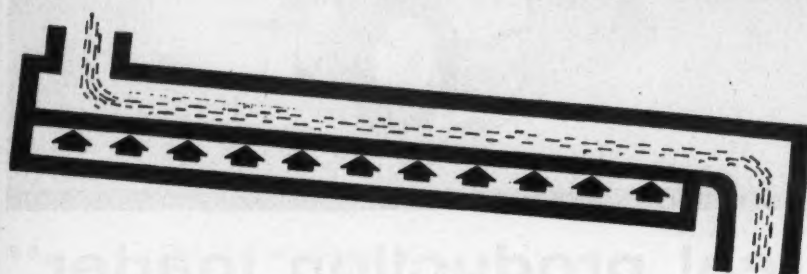
CITY \_\_\_\_\_

STATE \_\_\_\_\_

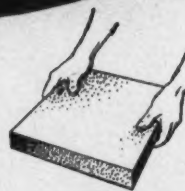
Check 2310 opposite last page.

# AIR-FLOAT

the better-built, more efficient  
air-gravity conveyor  
provides the answers to  
Dry Solids Conveying



The special porous plate is exclusive with KENNEDY AIR-FLOAT. It is strong, resistant to abrasion and temperature and has a smooth surface texture.



Sections are ruggedly designed, formed on modern production equipment and completely assembled before shipment.



**Q.** How does AIR-FLOAT work?

**A.** The dry material to be conveyed is fed on to a smooth, rigid, porous plate through which low pressure air continuously diffuses. Because the conveyor is inclined about 6 to 8°, the aerated material flows by gravity.

**Q.** What distinguishes the KENNEDY AIR-FLOAT from other air-gravity conveyors?

**A.** Primarily, the special porous plate. Also the casing is of heavier construction, flanged and channeled for greater rigidity.

**Q.** How is this special plate better than other porous media?

**A.** The AIR-FLOAT porous plate has literally millions of tiny pores through which the air diffuses uniformly for thorough aeration of the conveyed material. The plate is thicker, stronger, temperature- and wear-resistant, and has a very smooth surface texture.

**Q.** How does this improve conveying?

**A.** AIR-FLOAT has a much higher capacity than competitive air-gravity conveyors. Blind spots are eliminated and the angle of inclination is less critical.

**Q.** What about maintenance?

**A.** The KENNEDY AIR-FLOAT is the nearest thing to a completely maintenance-free conveyor that has ever been devised.

**Q.** Can turns be made?

**A.** Direction changes up to 45° are made with standard pieces. These can be combined for greater angles.

**Q.** Are accessories available?

**A.** Yes. End and side discharge boxes, splitters, control gates, transitions, bin extractors and required blowers can be provided.

**Q.** Have KENNEDY AIR-FLOAT Conveyors been fully tested and proven?

**A.** Yes. For more than 15 years AIR-FLOAT Conveyors have been successfully used in KENNEDY-designed cement and lime plants. With this background of experience, KENNEDY is now making AIR-FLOAT available to industry, mass producing it to sell at competitive prices.

For more information on AIR-FLOAT, ask for Bulletin 58-K.



## KENNEDY VAN SAUN

MANUFACTURING & ENGINEERING CORPORATION

405 PARK AVENUE, NEW YORK 22, N.Y. • FACTORY: DANVILLE, PA.

Check 2311 opposite last page.

## HANDLING & PACKAGING

is credited with having five advantages: 1) Cleanout to zero weight is complete. 2) Loading rates are relatively rapid — seven minutes for the fused base, 12 minutes for the phosphate. 3) Space requirements are minimized by the compact size of the jet-vacuum system. Since loading is accomplished through the journals, the operation is confined to two floors. 4) Maintenance is simplified; the ball valve is the only moving part. 5) Initial cost is low in comparison with alternate systems.

(Jet Evactors are manufactured by Croll-Reynolds Co., 753 Central Ave., Westfield, N. J.)

Check 2312 opposite last page.



## Blow-molded bottle . . .

. . . in five-gal size is believed to be largest single piece ever fabricated in polypropylene by this technique. Designed for preparation of batches of sterile solutions and culture media, bottle is tooled with cork-finish neck to take standard No. 12 rubber stopper. It will withstand repeated autoclaving, weighs 2½ lb, and is non-toxic.

(Nalgene solution bottle is development of The Nalge Co., Inc., 75 Panorama Creek Dr., Rochester 2, N.Y.)

Check 2313 opposite last page.

For more information on developments reported in this section, check corresponding numbers on Reader Service Slip opposite last page of this issue.

## HANDLING & PACKAGING

### Square-cornered air bags trim dunnage expense

**Uses:** Cushioning freight against damage in freight cars, trucks and ship holds.

**Features:** Square-corner construction and an exclusive bellows-like internal reinforcement feature, which controls bag expansion, combine to retain rectangular shape of bag under all working pressures.

**Description:** Rubberized fabric bag can be inflated in minutes by air hose and a portable air compressor. The bags are easily deflated for unloading and are reusable indefinitely. They operate efficiently in an expansion range between 6 and 24". Standard sizes range from 24 to 48" widths with lengths from 60 to 108".

Manufacturer reports one shipper is saving \$84.70 per car by using the bags to replace wood and strapping formerly used.

(Sqair-Pak dunnage bags are a development of B. F. Goodrich Aerospace and Defense Products, division of The B. F. Goodrich Company, Akron, Ohio.)

Check 2314 opposite last page.

### High impact and low cost combined in vibrator

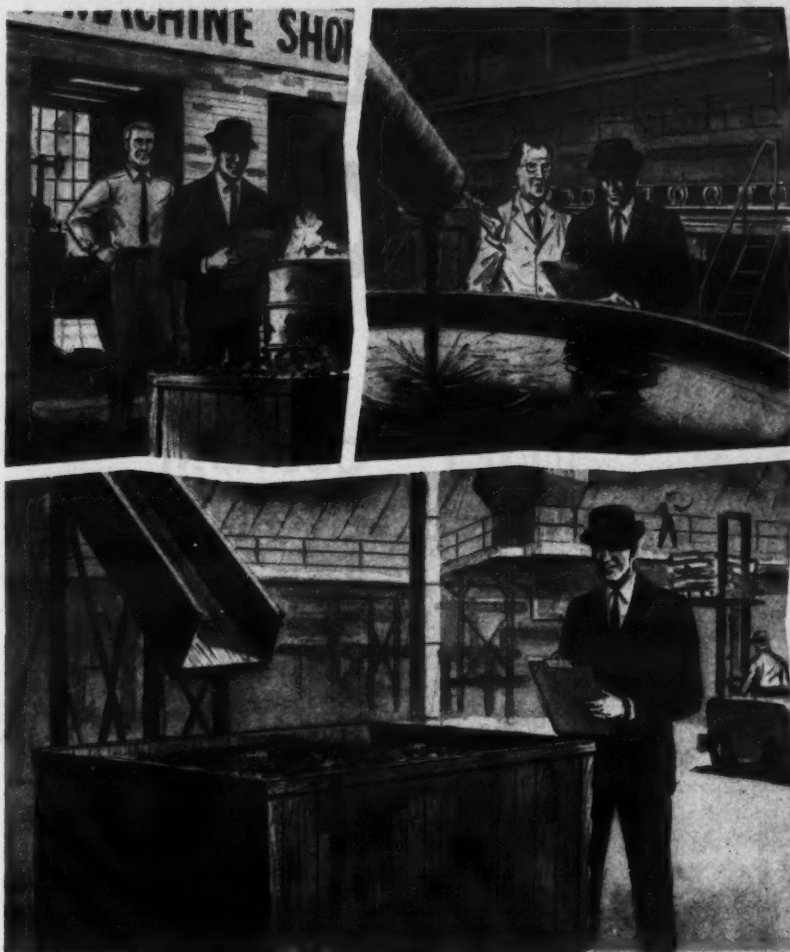
**Uses:** Vibrator for continuous or intermittent service on light-duty applications.

**Features:** External mechanical air gap adjustment changes vibration intensity with turn of bolt. This will vary intensity of vibration at frequency of 3600 vibrations per minute. Vibrator sells for \$30.00.

**Description:** Designed for use on small bins, chutes, and hoppers, electric vibrator has cast aluminum body. It is attached to bin by means of two cast feet, eliminating need for special mounting base. Vibrator measures 6 x 3" around base, and is 5" high.

(MC-2 electric vibrator is a product of The Cleveland Vibrator Company, 2828 Clinton Ave., Cleveland 13, Ohio.)

Check 2315 opposite last page.

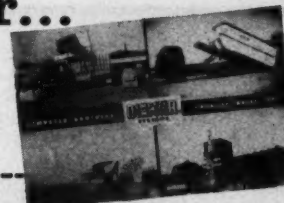


## These "Super-Snoopers" Save Industry Millions of Dollars Each Year...

"Super Snoopers" are "Cost Detectives" who can help you ferret out wasted waste dollars. In reality they are Dempster-trained waste and refuse engineers who offer a free consultation and survey service to industrial plants (large or small) without obligation of any sort. These men are abreast of the latest breakthroughs in waste storage and collection and make hundreds of surveys and consultation calls each year, resulting in millions of dollars in savings. Sometimes a minor improvement, such as an inexpensive chute or conveyor, can mean thousands of dollars saved. Or, a few containers rented from a private hauler can effect big savings. There is a Dempster-trained engineer near you, and this consultation service is yours for the asking . . . so why not write today?



Dept. CP-12, DEMPSTER BROTHERS, Knoxville 17, Tenn.  
Inc.



To: Dempster Brothers, Dept. CP-12  
Knoxville 17, Tenn.

- ☐ Please send details of consultation service  
☐ Please send Catalog Brief 160

Name \_\_\_\_\_ Title \_\_\_\_\_

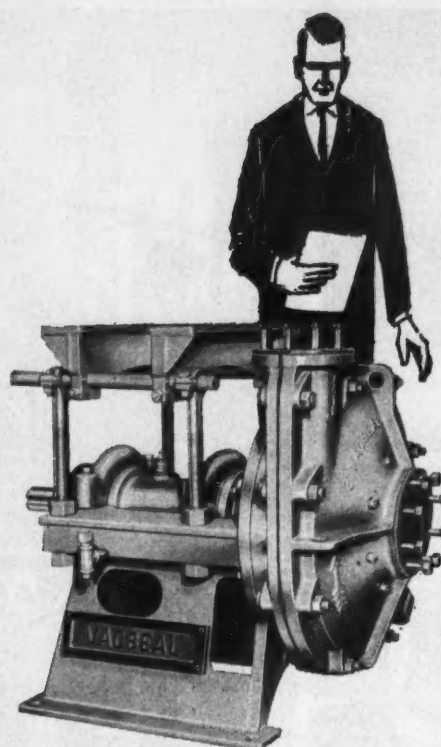
Company \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_

**DEMPSTER  
DUMPSTER**

Check 2316 opposite last page.



COMPANIONS FOR  
MATERIAL FLOW CONTROL



GALIGHER DELTA® VALVE



GALIGHER SQUEEZE VALVE

Both feature straight-through flow replaceable diaphragms. Valve bodies available in cast iron, aluminum and ductile iron.

# GALIGHER VACSEAL



**CUSTOM  
ENGINEERED  
FOR YOUR  
PUMPING  
REQUIREMENTS**

- Exclusive impeller design eliminates gland leakage.
- Sealing water is not required.
- Designed to handle abrasive slurries, corrosive solutions, high-density pulps, semi-solids, sludges or slimes.
- Available in sizes from 1½" to 8" to handle capacities up to 3,600 GPM, with heads up to 100 ft. and particle sizes up to ¾".
- Impellers and replaceable, non-collapsible liners furnished in Natural Rubber, Neoprene, Hypalon, Buna or Butyl reduce replacement costs.
- Pumping elements also available in Cast Iron, Stainless Steel, and other alloys.
- Gland parts are available in Teflon, Ceramic, Haveg, Bronze, Stainless Steel, Cast Iron, Hastelloy, or other alloys.
- Direct or V-belt driven models available.

PLACE A GALIGHER VACSEAL ON TRIAL IN YOUR PLANT.

## GALIGHER

CONSULTATION • ORE TESTING • PLANT DESIGN

**GALIGHER PRODUCTS:** AGITAIR Flotation® Machine, VACSEAL Pump, Geary-Jennings Sampler, Acid-proof Sump Pump, Galigher DELTA® Valves, Galigher Squeeze Valves, Rubber Lined and Covered Products, Plastic Fabrication.

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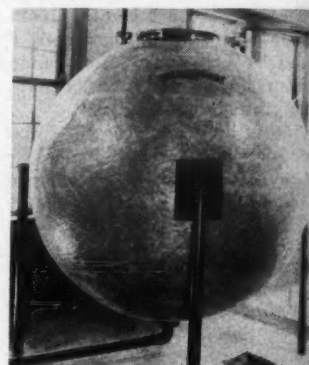
## HANDLING & PACKAGING

**Weight of spherical tank  
1/7 that of steel**

**Uses:** Processing and storage unit for acids, alkalies and bleaches.

**Features:** High resistance to corrosion is provided by utilizing a specialty bisphenol A polyester resin in conjunction with filament-wound glass fiber. Spherical shape provides minimum surface area per unit of volume and minimum stress concentration.

**Description:** Tank is available in diameters of 6' (847 gal) and 8' (2009 gal). The 6' model with manhole, line



High strength and resistance to corrosion are features of glass-reinforced polyester spherical tank

connections, couplings and drain connections is priced at \$585. The 8' model costs \$900. Weight of tank is approximately 1/7 that of a comparable stainless-steel unit.

(Chemisphere tank is a development of Justin Enterprises, Inc., 3755 Edwards Rd., Cincinnati 9, Ohio.)

Check 2318 opposite last page.

**Conveyor buckets operate without jamming**

**Uses:** Vertical and inclined movement of free-flowing bulk materials.

**Features:** Buckets won't loosen, fall out or jam.

**Description:** Conveyor buckets are guided securely in channels and provided with bearing followers which ride

To page 112

Check 2317 opposite last page.

CHEMICAL PROCESSING

# WHITEY

## MICRO-REGULATING CORROSION RESISTANT LABORATORY FEED

# PUMP

That a Whitey Pump sells itself is evidenced by the fact that customers who have purchased one invariably purchase another. The reason for this is simple. Unusual design features and extreme quality control assure trouble-free performance and qualify this pump for the most critical research and industrial service.

### METAL DIAPHRAGM DESIGN

Hydraulically actuated diaphragm design provides zero leakage pumping. Fluids can never be contaminated by packings or seals and are completely contained by a metal to metal diaphragm seal.

### ACCURATE LOW FLOW RATES

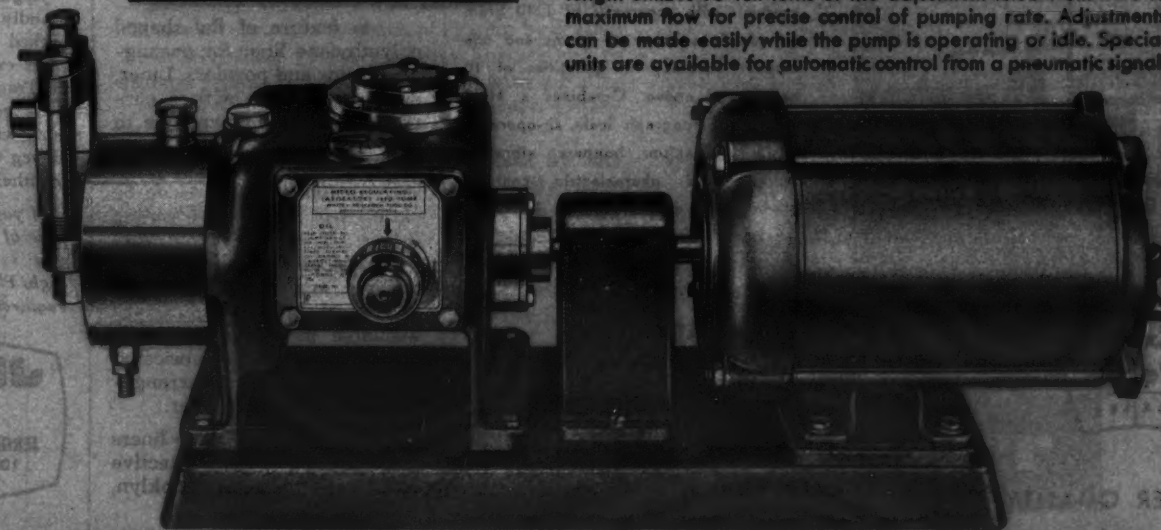
The Whitey pump is available for maximum pumping capacity of 2½ gallons per hour. Six different plunger sizes, three standard gear ratios, and three motor speeds offer a flexibility in design to suit your exact requirements. Stroke adjustment permits low flow rates to less than 5 ml per hour.

### CORROSION RESISTANT

Type 316 stainless steel is used for all wetted parts for maximum corrosion resistance. Monel, Inconel and Hastelloy are available for special applications. Explosion proof motors are standard equipment on all Whitey Micro-regulating Feed Pumps.

**MICROMETER ADJUSTMENT:** Micrometer adjustment of stroke length utilizes 10 full turns of the adjustment knob from zero to maximum flow for precise control of pumping rate. Adjustments can be made easily while the pump is operating or idle. Special units are available for automatic control from a pneumatic signal.

## THE PUMP THAT SELLS ITSELF



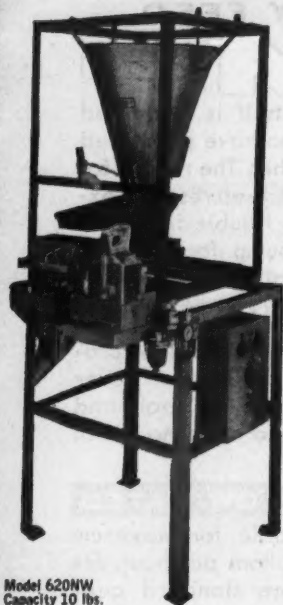
For more information on product at right, specify 2319 see information request blank opposite last page.

# WHITEY

## FOR EXACTING SERVICE

RESEARCH TOOL CO. • 5525 MARSHALL STREET • OAKLAND 8, CALIFORNIA

# EXACT WEIGHT® Automatic Net Weighing Machines



Model 620NW  
Capacity 10 lbs.

**FOR PACKAGING, BAGGING,  
BATCHING, COMPOUNDING**

## Exact Weight offers:

- Precision industrial-type scale.
- Over-under indicator visual check eliminates need for separate checkweighing operation.
- Calibrated adjustments with counterweights of known value; graduated beam, poise and scale indicator.
- Design backed by 45 years of experience in specialized weighing equipment.
- Readily accessible service and maintenance facilities.
- Performance guaranteed in writing.

Weights and feeds any dry, free-flowing materials . . . fast and accurate operation . . . helps cut production costs. Write for Bulletin 3318 for details and specifications.

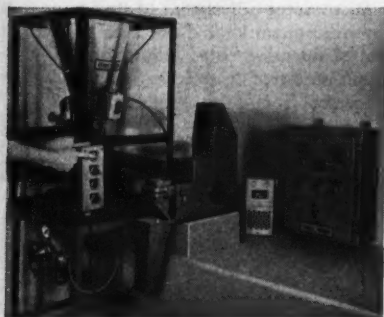
## Automatic Net Weigher

Net Weigher can be supplied without the feeder machine, support frame and discharge chute. The unit may be adaptable to your specific operation. Write for Bulletin 3311.



Model 610NW  
Capacity 3 lbs.

## Precision Automatic Net Weighing Machine



Model 4601 NW, left, for weighing dry products with accuracies of 1/10 gram on quantities below 10 grams and one percent accuracy on quantities of 10 grams and above. Combines a high-accuracy Shadograph Scale, air-operated dump mechanism, hoppers, vibratory feeders and photoelectric controls. Models with capacities from 50 grams to 500 grams. Write for Bulletin 3363.



**THE EXACT WEIGHT SCALE CO.**  
905 W. FIFTH AVE., COLUMBUS 8, OHIO  
In Canada: 5 Six Points Road, Toronto 18, Ont.

*Sales and Service Coast to Coast*

**BETTER QUALITY CONTROL . . . BETTER COST CONTROL**

Check 2320 opposite last page.

## HANDLING & PACKAGING

*From page 110*

inside channel to reduce friction and prevent wear. Buckets can be removed only by taking off front plate of channel.

Two basic types are available — vertical and inclined. Three bucket sizes, 4, 6 and 12" are offered. Rate of speed ranges from 100 buckets/min for 4" bucket conveyors to 27 buckets/min for 12" bucket conveyors.

(Bucketglide conveyors are manufactured by Clermont Machine Company Inc., 280 Wallabout St., Brooklyn 6, New York.)

Check 2321 opposite last page.



## Reclosable spout . . .

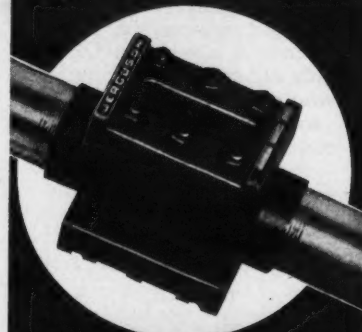
. . . is feature of flat-shaped polyethylene liner for packaging liquids and powders. Liner, designed for use with a corrugated carton, is available in both low- and high-density polyethylene. Screw-cap closure available or spout can be closed with inexpensive sealing tool.

Weight savings through use of liner and carton are estimated at 40%. Liners are available in 2-½-gal and 5-gal sizes but can be fabricated to any size by special arrangement with manufacturer.

(Fil-N-Flo polyethylene liners are produced by Protective Lining Corporation, Brooklyn, N.Y.)

Check 2322 opposite last page.

## NEW . . . Jerguson Sight Flow Indicators



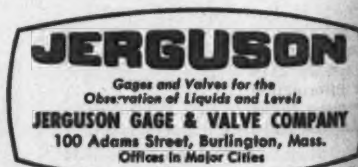
*easily and inexpensively  
installed to show movement  
of liquid in pipe lines*

Here is a new line of Sight Flow Indicators . . . easily and inexpensively installed in any new or existing pipe line ½" to 2" N.P.T.

The special design of these new indicators results in a turbulence in the flow of liquid, making it easily visible. Several types of indicating vanes, installed within the chamber, may also be furnished, according to variable conditions of rate of flow and viscosity of liquid. For indication of minute flows, small Sight Flow Indicators with a rotating vertical rising ball are available.

Jerguson Sight Flow Indicators are soundly designed, carefully made, and are backed up by a company with over 40 years experience in the field. Available in Transparent and Reflex types, in a wide variety of materials and linings, and with Wedge Type Illuminators, Haveg Chambers, Non-Frosting Glasses, or other special construction.

*If you have a problem of viewing the flow of liquid in a pipe line, it will pay you to investigate the new Jerguson Sight Flow Indicators today. Send us your requirements or write for Data Unit.*



Check 2323 opposite last page.

**CHEMICAL PROCESSING**

## NEW LITERATURE

### Material Handling and Packaging

Molten polyethylene's advantages as a laminant are cited and possible combinations of extrusion laminations suggested in six-page Extrusion Laminations Bul — Flexible Packaging Division, Continental Can Company.

Check 2324 opposite last page.

Material handling accessories, cabinets, benches, trucks, dollies, drum lifters and other manual equipment are illustrated in 66-page Material Handling Cat — The Vince Basnik Co.

Check 2325 opposite last page.

Conveyor systems, pneumatic and fluidized, are introduced in 12-page bul, along with components; rotary compressors; vacuum pumps, of both vane and lobe type; horizontal grate coolers; and centrifugal fans. Bul G-3E — Fuller Company, subsidiary of General American Transportation Corp.

Check 2326 opposite last page.

Flat belt conveyors, for package handling, may be customer assembled from standard components. Bul UNK1158 — Conveyor Specialty Co., Inc.

Check 2327 opposite last page.

Strapping materials, rayon and steel, are evaluated in 12-page report which summarizes tests conducted in which freight hazards were simulated. Avistrap Report — Industrial Packaging Department, American Viscose Corp.

Check 2328 opposite last page.

Weather forecasts on monthly basis is being provided bag users in 4-page newsletter, Weathervane — Bag Div., St. Regis Paper Co.

Check 2329 opposite last page.

Tank scales, accurate to  $\pm 1\%$ , and indicating and recording devices which may be used with the scales are described in Howe Scale Brochure — Howe Scale Co.

Check 2330 opposite last page.

Electric hoists, equipped with overload cutoff to protect operator, are cataloged in Cat DH-173 — Wright Hoist Division, American Chain & Cable Company, Inc.

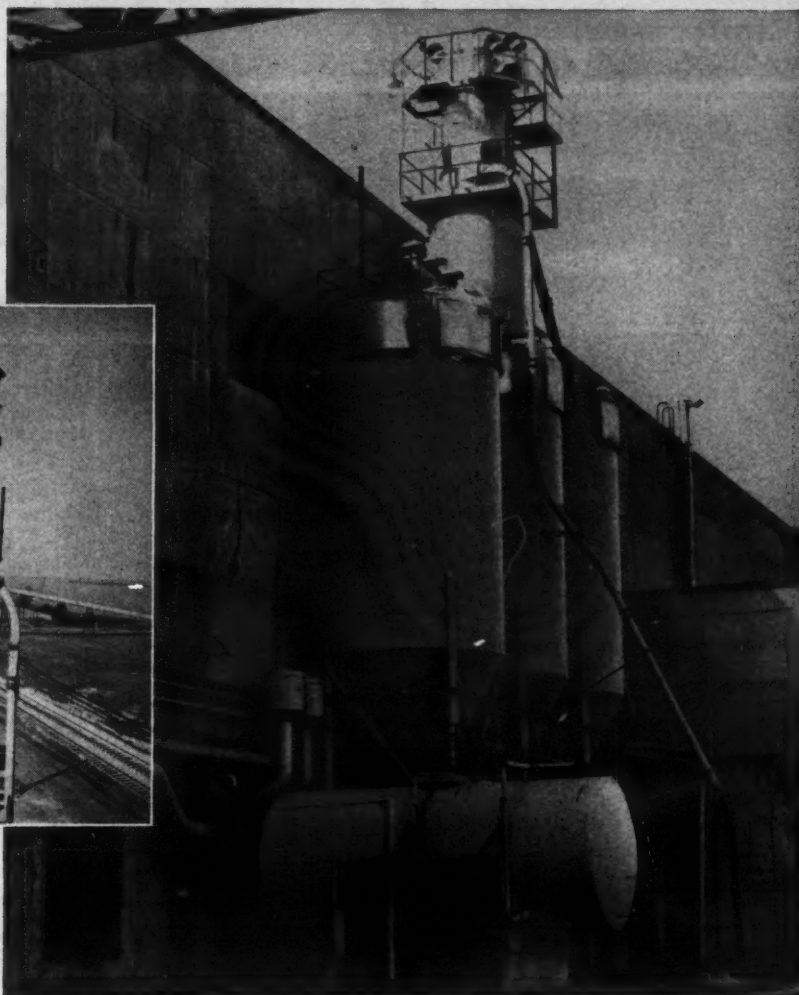
Check 2331 opposite last page.

Plastic-pellet pneumatic conveying systems, designed and manufactured by the company are presented in 4-page Bul P-I-P — National Conveyors Co., Inc.

Check 2332 opposite last page.



Overall view shows conveying line running in front of storage tanks to Airveyor filter at top.



## Pneumatic Conveying System Handles Both Corn And Potato Starch At Crown Zellerbach Plant

Economy, versatility and provision for future expansion are main features of system by Fuller. Bulk handling of starch from hopper-car to storage silos is being accomplished with a Fuller Airveyor® pneumatic system at Crown Zellerbach's Antioch, California, plant.

Starch shipments arrive at the plant by rail. A Fuller dual-feed unloader is quickly positioned to transfer the starch through the 6 inch diameter system a distance of 100 feet to storage at a maximum rate of 14 tons per hour.

Delivery is to three tank silos—one for potato starch—through a Fuller Airveyor Filter.

While the system was planned for corn starch handling only, its ability to handle potato starch as easily has proved a bonus value. Original planning also provided for a system capable of handling future plant expansion requirements without alteration or expansion of the Airveyor system.

If your plant is currently handling fine dry materials in bags, check with Fuller. Our engineers may be able to recommend an appropriate system that will offer results similar to those gained by Crown Zellerbach.

4075  
A 238

See Chemical Engineering Catalog for further details and specifications.



**FULLER COMPANY**  
136 Bridge St., Catasauqua, Pa.  
Subsidiary of General American Transportation Corporation  
Offices in Principal Cities Throughout the World



Check 2333 opposite last page.

# Parts



Tractor and train proceed through automatic gate into storage area. Driverless system reduces travel time spent by fork-lift trucks

A variety of parts and materials is hauled along guide-wire paths by five-truck driverless-tractor tow train





# distribution quickened by driverless-tractor system

**Esso's Stores Department achieves better control of parts  
flow, increased handling capacity at low cost**

**Problem:** The Stores Department at Esso Standard Division of Humble Oil and Refining Company, Baton Rouge, La., was having an increasingly hard time meeting the growing demand for its services. Its material-handling methods could not cope economically with the increasing volume.

Supplying parts and materials for the company's oil operations in surrounding states, the department is located in the 750' by 460' Central Mechanical Building in which maintenance shops also are housed. In the shops, pipes are welded, tanks are built and drilling equipment is repaired for the field operations. It is the Stores Department's

job to supply parts to the shops as required.

Part of the material was delivered to the repair departments by an in-floor tow conveyor, which hauled trailer loads from storage to repair shop, back to storage and to a shipping area. But, primarily, material was carried to remote areas of the plant by high-lift fork trucks.

**Solution:** After considering all alternatives for boosting handling capacity, Esso added a driverless-tractor system. A tow train of five trucks — each truck capable of carrying two tons — travels automatically by electronic guidance to all parts of the building.

The system combines a

number of advantages for Esso's particular case: relatively small equipment outlay and no operator expense; no need for expensive building changes; and flexibility, in that routes can be changed with little cost or effort.

The battery-powered tractor automatically follows an energized guide wire embedded in the concrete floor. The train closely follows the wire at a rate of 2¾ mph. The path, or loop, the train will follow is chosen by a switch on a control panel in the stores section.

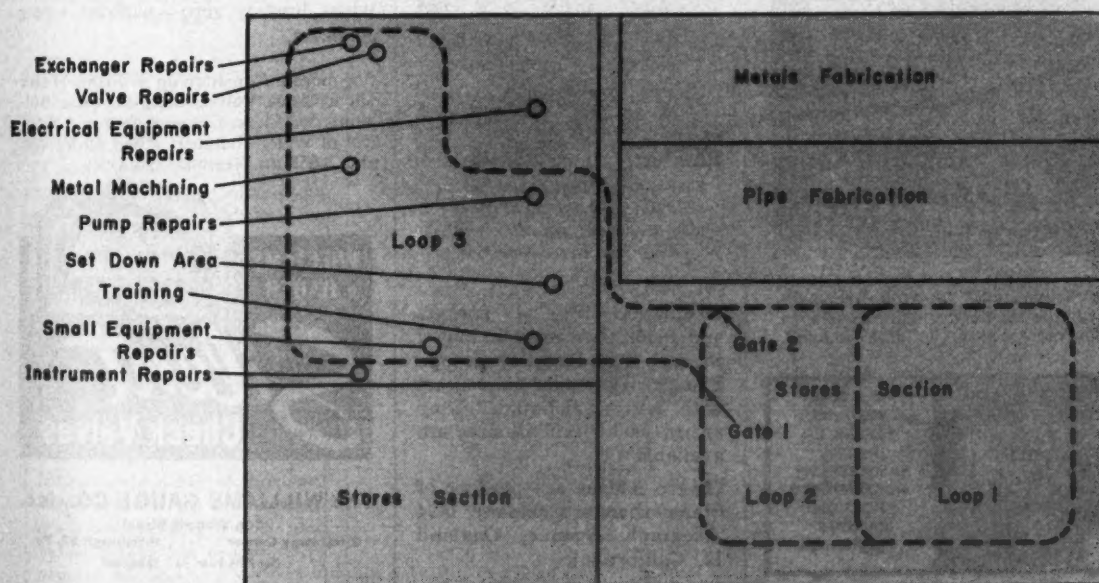
Stops are made at so-called "beacon" stations enroute. The "beacons" consist of a square loop of wire in the floor in which a stopping signal is

generated. The stops can be programmed with switches on the control panel, or by setting wall switches at the individual beacon stations.

The stopped tractor automatically sounds a horn until someone comes to service it. A safety bumper also stops the tractor whenever it contacts an object in its path.

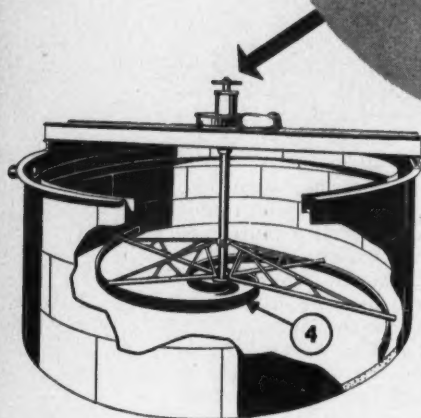
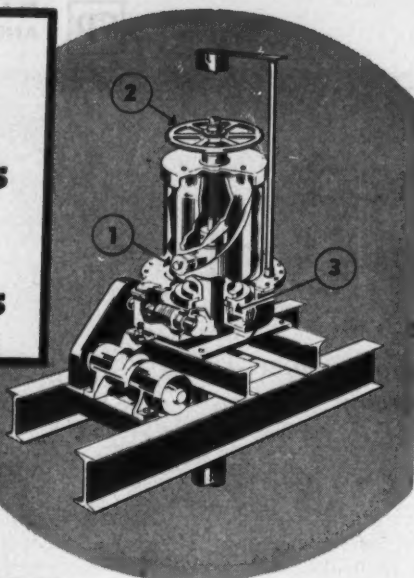
When desired, the tractor and some of its train may be manually driven away from the guide patterns to make deliveries and pick up or leave trucks. The tractor can uncouple trucks automatically.

The in-floor tow conveyor is still used in its own particular section. The fork trucks now are used for short hauls only and to load or unload the



Guide-wire paths connect storage to shipping and shop. Loop to be traveled in 750' x 460' building is chosen by switch on control panel

# Hardinge THICKENERS and HYDRO- SEPARATORS



1. "Auto-Raise" device.
2. Manual or power raise.
3. Replaceable ring-type ball bearing support.
4. Spiral rakes, and "froth rings."

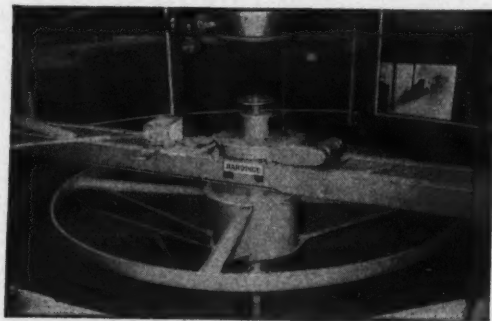
The higher the solids content in the thickener underflow, the lower the cost of filtering for subsequent processing or disposal.

The spiral rakes of the Hardinge Thickener compress the solids to maintain high density of underflow.

The "Auto - Raise" drive mechanism prevents overloading as the underflow is thickened.

Submerged parts may be supplied with rubber or lead covering or fabricated from wood or any metal available for structural parts.

Complete specifications upon request. Bulletin 31-D-13.



Also available are "froth rings" for froth-free overflow and superposed type tank construction (as shown above) for minimum floor space and building economy.

**HARDINGE**  
COMPANY, INCORPORATED

Main Office and Works • 240 Arch St., York, Pa.

"Hardinge Equipment—Built Better to Last Longer."

NEW YORK  
TORONTO  
CHICAGO  
HIBBING  
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SAN FRANCISCO  
HOUSTON  
LAKELAND  
BIRMINGHAM

Check 2334 opposite last page.

## ENGINEERING & SAFETY

trailer trucks of the driverless tractor and in-floor tow system.

**Results:** The new system has produced an effective control of the flow of goods throughout the building, and the order scheduling procedure has been improved.

The system has increased handling capacity, at low cost, so that the Stores Department can quickly and efficiently service the plant and field needs. It has also reduced the travel time spent by fork trucks so that they are more available in the local areas.

(Guide-O-Matic driverless-tractor system is a product of Barrett Electronics, Inc., Northbrook, Ill.)

Check 2335 opposite last page.

## Flange plus 10 minutes joins pipe

**Uses:** Joining pipe.

**Features:** Pipe joining with flange requires five minutes to cut, five minutes to join, and necessitates no welding.

**Description:** Flanges need not be pre-fabricated to pipe. Flange-hole alignment and squaring is automatic upon



Pipe-joining flanges need not be pre-fabricated to pipe. Flange-hole alignment and squaring is automatic upon installation

installation. Sludge pockets and turbulence are eliminated through flush free-flow design. Flanges are never in contact with corrosive liquids. They are re-usable and all sizes are available.

(Eveco flanges are product of Stamperhanger Company, 1634 Telegraph Avenue, Oakland 12, California.)

Check 2336 opposite last page.

## AT THE GLIDDEN COMPANY



## remotely-operated pumps are protected by Williams-Hager Silent Check Valves

Pumps on the condensate return system of the Glidden Company's Adrian Joyce Plant in Baltimore are operated by remote control. Since suction and discharge valves on the lines remain open at all times, check valves assure effective operation and protection of these pumps by closing instantly when flow reversal starts or when flow is zero—without water hammer.

For more information on Williams-Hager Silent Check Valves, write for these Bulletins: #851 on Cause, Effect and Control of Water Hammer; #654 on Valves; and #659 on Pressure Loss Tests.

WILLIAMS  
• HAGER

**Silent**  
Check Valves

The WILLIAMS GAUGE CO., Inc.

146 Stanwix Street  
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Check 2337 opposite last page.

CHEMICAL PROCESSING

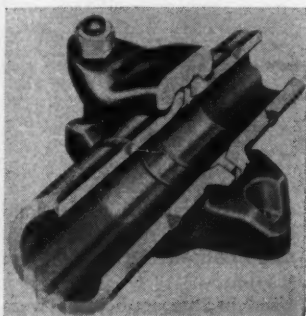
**Bantamweight connections  
work well under pressure**

**Uses:** High-pressure liquid and gas pipe-connection applications.

**Features:** In pre-marketing tests conducted by manufacturer, a two-inch connection withstood 26,000 psi at which point the pipe failed.

**Description:** Connection's resistance to pressure and stress is achieved through use of all-metal seal ring with flexible tapered lips on either side of rigid rib. Lips do actual sealing against mating hubs.

Angle of taper of lips is slightly less than that of sealing surface of mating hubs. As connection is tightened by clamps, hubs are brought together causing seal-ring lips to deflect. Stored energy in lips provides primary sealing



Two-inch high-pressure connections have withstood 26,000 psi in tests

force. Since all-metal seal ring is completely re-usable, need for replacement gaskets is eliminated.

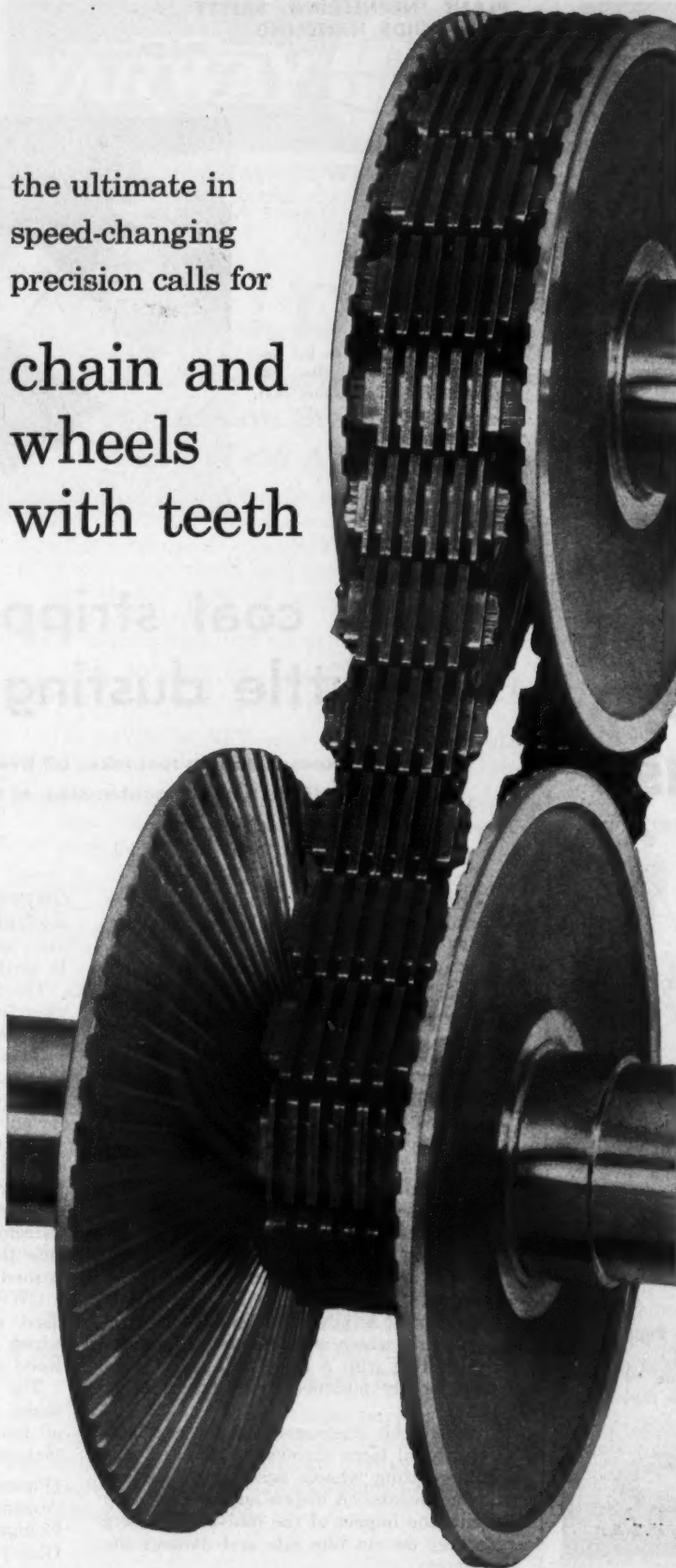
Connections are stocked in sizes of 1 to 30". Collar-type connections, in addition to regular clamp type, are available.

(Grayloc pipe connections are product of Gray Tool Co., Box 2291, Houston 1, Tex.)

Check 2338 opposite last page.

For more information on developments reported in this section, check corresponding numbers on Reader Service Slip opposite last page of this issue.

the ultimate in  
speed-changing  
precision calls for  
  
chain and  
wheels  
with teeth



## LINK-BELT P.I.V.

Positive, Infinitely  
Variable accuracy with  
industry's only chain-  
driven speed changer

Variable from maximum to minimum speeds—with no steps or stops in between—Link-Belt P.I.V. is the answer to speed-changing applications that won't tolerate slippage.

Unusual speed control accuracy results from P.I.V.'s unique design featuring wheels and chain with teeth. The two pairs of conical wheels act as gears . . . mesh with self-tooth-forming chain to assure positive contact under all speed and load conditions.

A turn of the control screw changes the speed. The control screw simultaneously varies the effective diameters of the conically shaped wheels—closing one pair, spreading the other. This automatically, instantly adjusts the chain to provide a different output speed.

Contact your Link-Belt office or authorized distributor for more information about P.I.V. drives, 1/2 to 25 hp. Send for catalog.

**LINK-BELT**  
VARIABLE-SPEED DRIVES

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Warehouses, District Sales Offices and Stock Carrying Distributors in All Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney); Brazil, Sao Paulo; Canada, Scarborough (Toronto 13); South Africa, Springs; Switzerland, Geneva. Representatives Throughout the World. 15,000

Check 2339 opposite last page.



## Work Gets Done Faster with a **RIGID** **TRISTAND VISE** on the job!

Here's a solid workbench to speed all cutting, threading and reaming out on the job. No other vise offers as many work-saving features as this **RIGID** No. 40-A Tristand Yoke Vise. • Big, rugged malleable vise base has 3 bending grooves, 6 tool slots, rear pipe rest and a ceiling brace screw for absolute rigidity if legs aren't bolted down. • Base overhangs front legs for clear tool swing. • Extra-large yoke latch opens for easy, fast insertion of long pipe lengths. • Replaceable LonGrip jaws give, slip-proof grip. • Handy tool tray locks legs open during use but folds for easy carrying with legs snap-chained together. **RIGID** No. 450 Tristand Chain Vise with 1/8" to 5" capacity is also available.

Call your Distributor today. For your convenience, he maintains a complete stock of **RIGID** Work-Saver Pipe Tools and parts.

# **RIGID**

Check 2340 opposite last page.



**EASY TO FOLD**



**EASY TO CARRY**



**Extra Rigid in Use**

## PLANT ENGINEERING, SAFETY AND FLUIDS HANDLING

Concrete shows clean but undamaged surface after removal of stubborn epoxy coat



## Epoxy coat stripped fast with little dusting

Power cleaning tool takes off five layers in  
half the time of sandblasting, at two-thirds the cost

**Problem:** Neither sandblasting nor burning was found suitable for removing a five-layer, 1/32" accumulation of blistered epoxy-resin paint from walls and floors of a concrete paper stock tank at Consolidated Water Power & Paper Co., Wisconsin Rapids, Wisconsin.

Sandblasting the 4200 sq ft of surface would be slow, costly and dusty — as proved by a two-day trial. The dust generated could not be tolerated in the nearby papermaking operation, nor in the contacts and brushes of electrical motors in the area.

Burning was ineffective. It did not soften the epoxy coating enough to allow scraping.

**Solution:** A power cleaning tool was found which was effective. It attacks the coating with a large number of cutters, loosely pinioned around a rotating head.

When the high-speed head revolves, centrifugal force throws the toothed circular cutting wheels against the surface to be cleaned. A depth-adjustment shoe limits the impact of the tool-steel cutters so they do not bite into and damage the concrete.

Before power cleaning, the tank at

CWPPC was thoroughly washed and scaffolding installed. Then, eight workmen, using four tools in shifts, were put to work on the job.

The tools used in this application were electrically driven but pneumatic models are also available.

**Results:** The job was completed in half the time that it would take to sandblast. The cost was estimated as one-third lower than that of a sandblast job.

Minimum dust was raised, resulting in safer and better working conditions. Too, the awkward, cumbersome sandblast equipment was eliminated. These factors, therefore, allowed more men to work inside the tank, permitting the job to be rushed through to completion.

CWPPC found success again when it used these tools for cleaning concrete which long had been exposed to ground-wood and paper stock.

The tool can be used for removing scale, rust or other accumulations from all hard surfaces, according to its manufacturer.

(Power cleaning tool is a product of The Aurand Manufacturing and Equipment Company, 1310 Ellis Street, Cincinnati, Ohio.)

Check 2341 opposite last page.

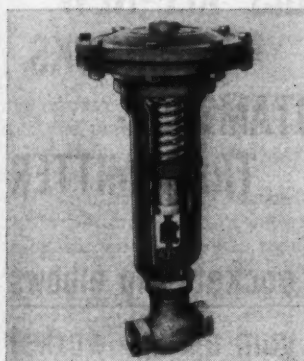
CHEMICAL PROCESSING

**Diaphragm control valve  
has tight closure,  
O-ring stem seal**

**Uses:** Pressure regulating on steam, water, oil or gas. Valves can be used as governors to control output pressure from turbine-driven or direct-acting pumps. Suitable for small pumps which require tight-closing governors to control pressure accurately at minimum loads.

**Features:** Valves have O-ring shaft seals to eliminate use of stuffing boxes. Valve shuts off tight on closure. Reverse-acting models are available.

**Description:** Valves are single-seat globe type with bevel disc or composition disc, and diaphragm operator. Bronze



O-rings replace stuffing box on valve

bodies are rated to 300 psi up to 500°F. Steel bodies are available for 600-psi working pressure.

(Cat Sheet 171 Type D pressure-reducing valves are available from Atlas Valve Company, 280 South Street, Newark 14, New Jersey.)

Check 2342 opposite last page.

**NEXT MONTH**

How much can control valve maintenance cost you? An instrument engineer was surprised when he checked cost records for keeping misapplied valves in service. He tells his views on the subject in this section next month.



from Yarnall-Waring Company, Philadelphia 18, Pa.

BRANCH OFFICES IN 19 UNITED STATES CITIES • SALES REPRESENTATIVES THROUGHOUT THE WORLD  
STEAM TRAPS STOCKED AND SOLD BY 270 LOCAL INDUSTRIAL DISTRIBUTORS

# SOLID SUCCESS!

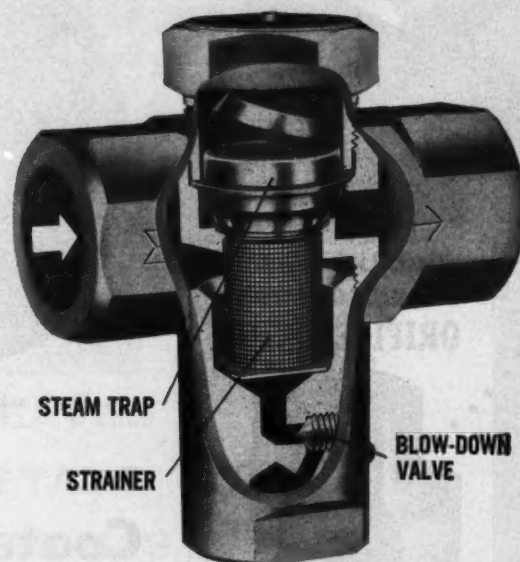
## Yarway Series 130 Combination Steam Trap Wins Wide Approval

In chemical plants, refineries, other process plants, utilities, institutions—wherever condensate is handled in moderate amounts—this new Yarway Impulse Steam Trap is winning friends by the score.

Because it is a unique combination steam trap, strainer and blow-down valve, it offers these advantages no other steam trap can duplicate:

- IT SAVES SPACE—entire trapping hook-up requires no more space than a "T" fitting.
- IT SAVES MONEY—only one unit to buy and install, up to 30% savings in time and materials.
- IT SAVES WORK—easy to install, easy to maintain. Stainless steel construction. Good for all pressures 8 to 600 psi. Sizes ½" and ¾".

Why don't you try a Yarway Series 130? Your nearby Yarway distributor can supply you—or write for Yarway Bulletin T-1743B.

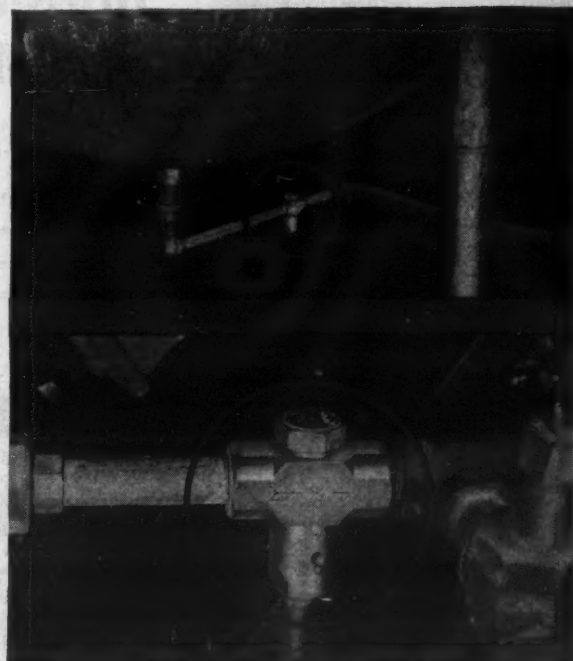


## CHEMICAL PLANT REDUCES CORROSION FAILURE —LIKES "COMPACT" DESIGN

For years, traps and strainers of iron and steel were subject to HCl and H<sub>2</sub>SO<sub>4</sub> acid corrosion failure in this chemical plant. Installations lasted only a few months. Now Yarway Series 130 steam traps are solving this corrosion problem because the trap, strainer and blow-down valve are combined in *one stainless steel body*. In addition, trapping hook-ups on processing kettles are greatly simplified.

## LAUNDRY OVERCOMES SPACE PROBLEM...GETS FASTER HEAT-UP, NO WATER HAMMER

Space was at a premium for steam trapping around the presses in this laundry, and also they couldn't get fast heat-up without water hammer. Yarway Series 130 combination steam traps solved all three problems to their complete satisfaction.



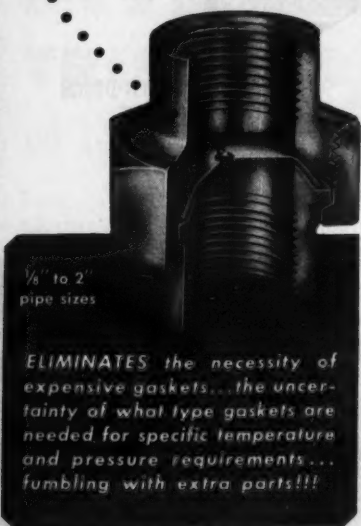
Check 2343 opposite last page.

here's real **ECONOMY...**  
time-saving **SIMPLICITY...**  
and  
sure-fire **DEPENDABILITY**

for metering, measuring,  
controlling any piped material!



this  
Catawissa  
Cup-Orifice  
Plate CONVERTS  
any standard  
Catawissa Union into a  
**GASKETLESS  
ORIFICE UNION**



**ELIMINATES** the necessity of  
expensive gaskets... the uncer-  
tainty of what type gaskets are  
needed for specific temperature  
and pressure requirements...  
fumbling with extra parts!!!

Orifice Union problems of the past are gone  
forever! Stainless or carbon steel cup-orifice  
plate fits easily, quickly, securely to form a  
good, tight, leakproof seal. Temperature and  
pressure requirements are restricted only by  
the rating of the union itself (3000-lb. serv-  
ice, 9000-lb. test)!

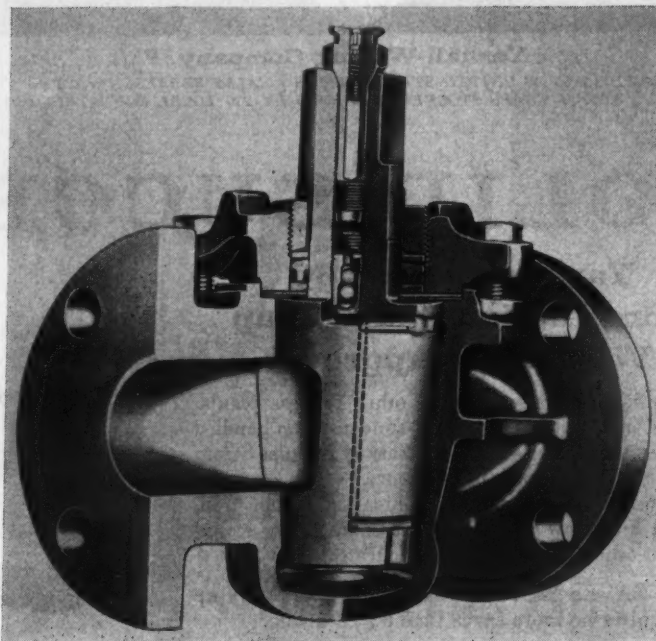
Just specify  
"Catawissa Cup-Orifice Plates"  
or "Catawissa Cup-Orifice Unions"  
at your favorite supply store—or write for  
catalog and complete information.

**CATAWISSA VALVE & FITTINGS CO.**

**CATAWISSA • PENNSYLVANIA**

Check 2344 opposite last page.

## PLANT ENGINEERING, SAFETY AND FLUIDS HANDLING



Plug is coated with either Teflon or molybdenum disulfide, accord-  
ing to pressure conditions

## Coated plug valve hurdles a variety of field tests

**High-lubricity coatings on plug provide:**

- ▶ ... easy quarter-turn operation
- ▶ ... drop-tight sealing
- ▶ ... maintenance-free operation

A **TAPERED PLUG VALVE**,  
known as a Permaturn valve,  
just introduced by Rockwell  
Manufacturing Company, is  
suitable for service to 10,000  
psig and 350°F. The valve has  
successfully passed rigorous  
field tests in a variety of criti-  
cal chemical process services  
including molten sulfur, car-  
bon disulfide, sulfuric acid,  
ammonia, chlorine, jet fuel  
and aviation gasoline.

A number of innovations

are embodied in the design,  
which will supplant the well-  
known Rockwell-Nordstrom  
plug valve. High-lubricity  
coatings in the order of 0.0005"  
thickness, permanently bond-  
ed to plug surfaces, insure  
drop-tight sealing and ease of  
operation for the life of the  
valve with minimal mainte-  
nance.

Two classes of valves are  
manufactured: A standard de-  
sign for pressures to 1000 psig

## THE FLOW GOES STRAIGHT-THRU



## THIS ALL-NEW BROOKS ROTAMETER- TRANSMITTER

no pockets, no elbows  
to gum up the works!

This is the rotameter-transmitter for  
your toughest flow-metering jobs.  
Brooks' new Model 3611-MPTX.

You can use it for slurries, still  
bottoms, Bunker oils, phthalic anhy-  
drides, tall-oil compounds—virtually  
any 'problem' fluid.

You can use it for electric trans-  
mission, pneumatic transmission, or  
flow integration—or transmission  
and integration.

Above all, you can use it with  
absolute confidence.

Have a look at the transmitter's  
unique magnetic float-position con-  
verter, and you'll see why.

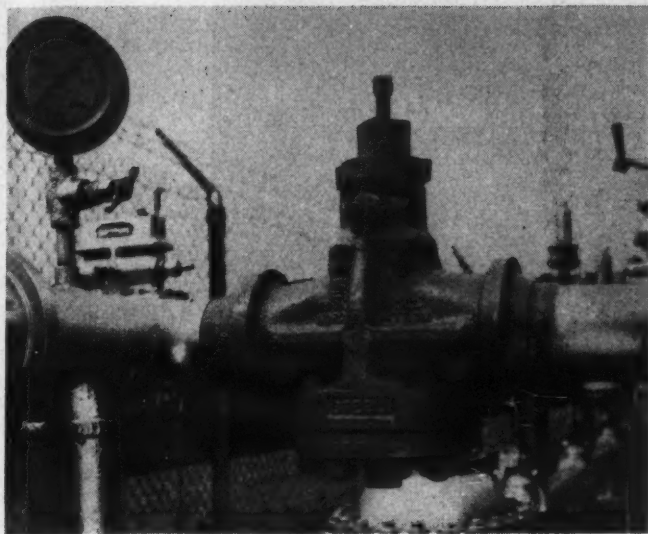
Design Specification Sheet DS-361  
gives details. Write for a copy.



**BROOKS**  
INSTRUMENT COMPANY, INC.  
5512 W. VINE STREET  
HATFIELD • PENNSYLVANIA  
19341

Check 2345 opposite last page.

CHEMICAL PROCESSING



Valve, which is available in sizes from 1/4" to 36", was extensively field tested prior to being made available commercially

and an inverted Hypreseal design for pressures as high as 10,000 psig. Both classes are rated for service to 350°F.

A fixed-adjustment assembly in the low-pressure series maintains an invariable, tight seal after repeated openings and closings. A threadless stem, supported by a thrust bearing, incorporated into hypreseal valves intended for high pressure service, has proved effective in reducing operating torque.

Traditionally, conventional fluid-control valves have required routine lubrication and maintenance. The ever-increasing number of flammable, corrosive and even poisonous fluids requiring control, at elevated temperatures and pressures, has aggravated and accentuated the maintenance problem and made it more costly.

All too often, routine maintenance, so necessary to proper valve functioning, is not carried out conscientiously. As a result, valve repair or replacement becomes necessary at more frequent intervals than would otherwise be expected.

The loosening of valve glands for ease of operation is still practiced; while pro-

viding operability, it frequently prevents positive, drop-tight shut-off in a critical fluid-control network. Factors leading to the design of the valve were: An increasing need for drop-tight shut-off, ease of operation at high pressures and a desire to reduce, if not eliminate, the maintenance function.

Frequent replenishment of lubricant is necessary in conventional plug valves to prevent base-to-base metal contact between working surfaces. A significant design change in Permaturn valves is the use of high-lubricity coatings, permanently bonded to the surface of the tapered plugs. The coatings eliminate metal-to-metal contact, and, by virtue of their low coefficients of friction, reduce operating torque tenfold. Teflon was selected for low pressure (to 1000 psig) service; phosphate-molybdenum disulfide for high pressure (to 10,000 psig) service.

The coatings also lessen the frequency of sealant replacement. A number of heavy-duty sealants, consonant with the fluid in the system, have been developed as have more efficient fittings and sealant

To page 123

WE HAVE THE  
**METALLIC  
FILTER CLOTH**

NEWARK  
for ACCURACY

TO FIT *Your* NEEDS

**ALL WEAVES  
ALL METALS  
ALL WEIGHTS**

**In rolls or  
cut to size**

Be certain you are using the **BEST, MOST EFFICIENT** woven wire filter cloth for your processing. We at NEWARK know filtering and we know from experience and testing, the best wire and the best weave for a given process.

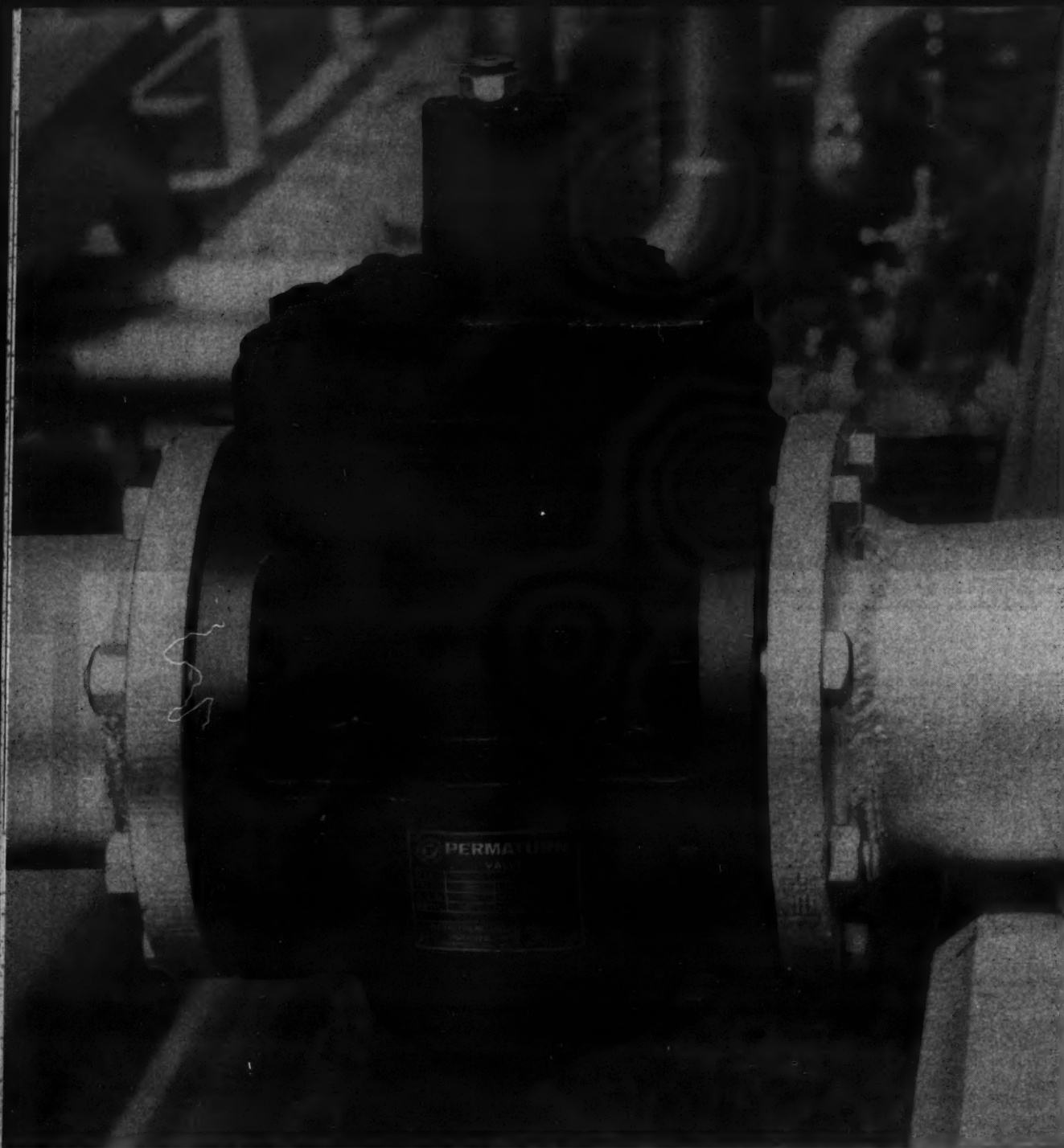
NEWARK  
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Send for a copy of Bulletin F-C.

**Newark Wire Cloth  
COMPANY**

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Teletype: NK607 • Tel: HUmboldt 3-7700

Check 2346 opposite last page.



**PERMATURN\* VALVES** • so new, we changed their colors, too. You'll find the new PERMATURN semi-steel valves bright red: a color just as bold as the design concept they represent. For Rockwell PERMATURN valves were designed to incorporate all the most-wanted valve features: to give you new valve versatility for easy services or tough ones. Steel PERMATURN valves are now gray and offer new standards of valve performance in the higher pressure services. To learn more about this exciting new valve line, write to Rockwell Manufacturing Company, 400 N. Lexington Avenue, Pittsburgh 8, Pennsylvania for a copy of the new Pocket Valve Guide.

\*Trademark Rockwell Manufacturing Company



For more information on product at left, specify 2347 see information request blank opposite last page.

From page 121

injectors. Seat replacement is carried out while the valve is in operation by injecting sealant through a button-head fitting on the valve.

Back pressure on the sealant chamber is prevented by double-ball checks located in the enclosed grooving system in both the valve plug and body.

These valves are stock items in sizes 1/4" through 36" in all standard pressure ratings. For pressures to 1000 psig WOG, they are of standard design; for higher pressures to 10,000 psig WOG an inverted hypreseal design is recommended.

They are available in cast iron, cast carbon alloy and stainless steels and in ferrous metals. Conventional plug openings are supplemented by V- and diamond-port designs for precise-throttling operations.

(Permaturn valve is a development of Meter and Valve Division, Rockwell Manufacturing Company, 400 N. Lexington Ave., Pittsburgh 8, Pa.) Check 2348 opposite last page.

#### Report low rebound loss and minimum dusting for sprayed refractory

**Uses:** Can be wet- or dry-gunned as lining for stacks, incinerator doors, ash hoppers, boiler furnaces, dust collectors, catalyst-carrying lines in refineries, and as a rear-wall seal on traveling-grate furnaces. Use limit is 2500°F.

**Features:** This high-strength castable refractory was developed for pneumatic gun placement. Low rebound loss, minimum dusting, and abrasion and thermal-shock resistance are reported.

**Description:** A highly-cal-cined, carefully-graded base is hydraulically bonded with a high-alumina cement. After heating to 2400°F, the cold crushing strength is 4200 psi.

(Kaogun-HS is a product of Refractories Division, The Babcock & Wilcox Company, 161 East 42nd Street, New York 17, New York.)

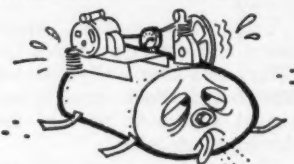
Check 2349 opposite last page.

ONE OF A SERIES OF CHARTS ABOUT THE CONSERVATION AND CONTROL OF HEAT

# SARCO TOPICS

## PREVENTION OF CRUELTY TO OLD COMPRESSORS

You've got at least one air compressor, of course. Doesn't everybody? And there it sits, pumping its heart out for you year in and year out. And you there, Simon Legree, do you ever give it a break and measure its capacity? One measure is the useful work done by your compressed air tools, of course. However, this yard stick may make your compressor installation seem way oversize, but don't blame the equipment. The puffing oldster isn't responsible for choked intake filters, poorly designed suction pipes,



overcooling, undercooling, inadequate distribution mains and wet air. All these things can cost you.

Off and on we're going to talk about compressors in these pages, if you don't mind. It's a big subject and the lesson for today will be confined to the air intake. Can you imagine a more logical place to start?

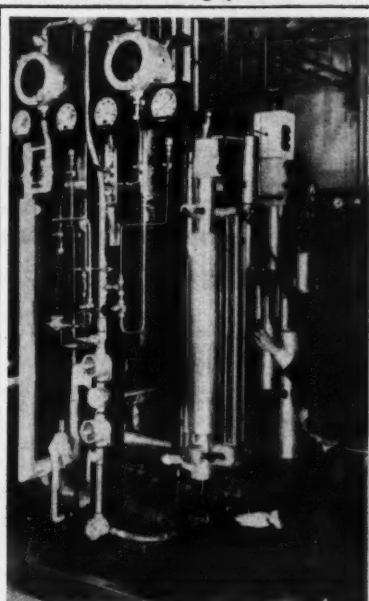
Where to locate the intake? Easy. Where the atmosphere is clean and cool and dry. Dirty air and grit choke filters and eventually get through to cause wear. The cooler the air, the more you can compress per revolution. You'll get 10% more air delivered at 40°F. than at 90°F. And dryness is imperative, because compressed air can't contain all the moisture it can hold in its uncompressed state. Where does the moisture go? Into mains, tools, and valves, unless it's removed. And need we add that chemical fumes cause corrosion? That includes exhaust gases from engines and furnaces. CO<sub>2</sub> in the presence of oxygen and moisture can rust your valves, tools, nozzles and sprays.

How about intake size? Keep pipes short, sized right, and straight as possible. Small pipes with snaky bends reduce pressure and capacity. For an educated example, a pressure loss due to friction in the intake pipe and filter of 2 psi (14.7 to 12.7) will reduce output of a 125 psi compressor by 7.5%. How do we know so much? Well, as we continue in future issues, we'll be talking drains and traps and cooling and safety controls for compressors—all of which we manufacture. That's how we know so much. If you can't bear to wait, just write. It's that easy to get information out of us.

## SARCO AND THE FLYING DUTCHMAN

In the pipe shop of a major office building complex on New York's east side, the Flying Dutchman flies again. This is really a bright idea which could well become standard practice elsewhere, because it's the kind of logical precaution that would make sense anywhere.

The chap in our photograph is putting together, according to precise, dimensioned drawings, an assembly consisting of a Sarco Thermo-Dynamic Steam Trap, Type TD-50, a Sarco strainer, and valves and fittings for stock. The assemblies will be used for quick and easy replacement in the event of failure or any possible maintenance requirement in the steam distribution system, the heating system, or the air conditioning system.



## WORLD'S LARGEST ESPRESSO MACHINE?

No indeed. It's a pilot plant Hydrofiner unit built by The Lummus Company at its Engineering Development Center in Newark, New Jersey. And its presence here is due to the fifteen 3/4" Sarco Thermo-Dynamic Steam Traps which vent and drain its 35 pound tracer lines plus a 1/2" TD-50 as a main drip. Nice to be picked for projects like this. Makes us proud.



We'd like to be able to report that this plan recently saved thousands of people from freezing or roasting during a crisis. So far, however, the assemblies have proved to be an ornamental kind of insurance policy. Alas, there have been no failures. That dog-goned Sarco performance is just too reliable for its own good.

## WE'VE GOT THINGS TO GIVE AWAY

First of all, we have a new spring clip to hold together a bunch of papers on your desk, or something. It's not complicated, but it is difficult to describe, so we've gone to the tremendous expense of having our local Michaelangelo sketch it here. If you have no papers to hold together, it makes a rather delightful snapping noise that might amuse you. Oh yes—it also has a cross section of a TD-50 steam trap printed on it which actually moves when you wiggle your eyeballs at it. In case you still don't know how a TD-50 works, this is for you.



Second, we've still got engineers' sketch pads which we enjoy giving away so much we're offering them again. In case you're new here (Hello!) they contain isometric grid paper for use by anyone involved in piping or hookup sketches for process or heating applications.

And the famous Sarco key chain, which is really exactly that—a chain—about 60 times as handy as a fat case, we're offering again too. This has a TD-50 replica attached, but detachable. Call it tawdry promotion if you will, but our super-aesthetic wife wears one proudly around her neck.

All of these are available from your Sarco representative. Or, if he's out, write in.

There's really no reason to keep this conversation one-sided. After all, we're both interested in these subjects or you wouldn't have read this far. So write, even if it's only about a difficult problem.

7826

**SARCO COMPANY, INC., 635 MADISON AVE., NEW YORK 22, N.Y.**

STEAM TRAPS • TEMPERATURE CONTROLLERS • STRAINERS • HEATING SPECIALTIES

**SARCO**

Check 2350 opposite last page.

## Blackboard brainstorming

Engineering-design technique  
skirts conventional drawings  
to cut idea-to-prototype time

T A B Engineers, Inc. — a Chicago-based consulting-engineering firm—recently designed and made a packaging machine for a food processor in 90 days at a cost of \$48,000. Amazingly enough, the men assigned to this project polished it off without once touching a drawing board. The same job, done in a conventional manner with the usual drafting paraphernalia, would have taken six months and carried a price tag of \$80,000.

This is just one example of the savings T A B claims it has consistently made by designing on large blackboards, photographing these and building directly from the photos.

Using this method, engineers and designers work together at a large wall-mounted blackboard. Each man is assigned a specific part of the design to develop.

The chief engineer can see the project in its entirety as it develops, instead of inspecting individual drawings one-at-a-

time. If a change is indicated it can be made by just erasing the chalk and sketching a new version. When the final design is completed, a detailed drawing is made immediately by use of a plastic overlay which is already ruled and on which the engineer can sketch the other views and dimensions. Photographs are then taken and the machine shop works directly from these pictures.

According to the firm's president, H. A. Evans, 78% of the engineering time formerly spent on a project was devoted to layout, detailing and revisions. With the new approach, the figure has been slashed to 34%.

There are other advantages to this blackboard-brainstorming design technique, according to Evans. He points out that each engineer sees the whole pattern of the design developing along with his particular part. Also, Evans feels that the method facilitates the engineers' contributing ideas to each other. ■



Drawing boards are conspicuously absent in this engineering room of T A B Engineers, Inc. Engineer at left is discussing proposed design on blackboard with supervisors at table. At right two more engineers are checking specifications against the designs on the rear board. Engineer at camera is preparing to photograph a blackboard design for a permanent record.



**THERE'S A RIGHT WAY TO HANDLE  $H_2O_2$ , TOO!**



**Becco  
Chemical  
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Check 2351 opposite last page.

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Cast aluminum receptor;  
twin fountain heads  
direct automatically  
regulated streams  
into the eyes.

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Sensitive eye tissue can be destroyed in moments. Contamination from industrial caustics and chemicals requires instant first aid . . . and a HAWS Emergency Eye-Wash Fountain can mean the difference between temporary irritation and permanent injury! Write for your free HAWS catalog.



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Since 1909

a product of HAWS DRINKING FAUCET COMPANY 1443 Fourth St. Berkeley 10, Calif.

Check 2352 opposite last page.

**Many applications seen  
for PVF tape**

Polyvinyl-fluoride film is now available with a pressure-sensitive silicone-polymer adhesive on one side, and can be obtained in roll form. The PVF tape is intended for application as a protective covering, release surface and electrical insulation. Initially, samples will be available for evaluation in one-inch x five-yd rolls at \$5.00 per roll.

(Temp-R-Tape PVF is product of Connecticut Hard Rubber Co., 407 East St., New Haven, Conn.)

Check 2353 opposite last page.



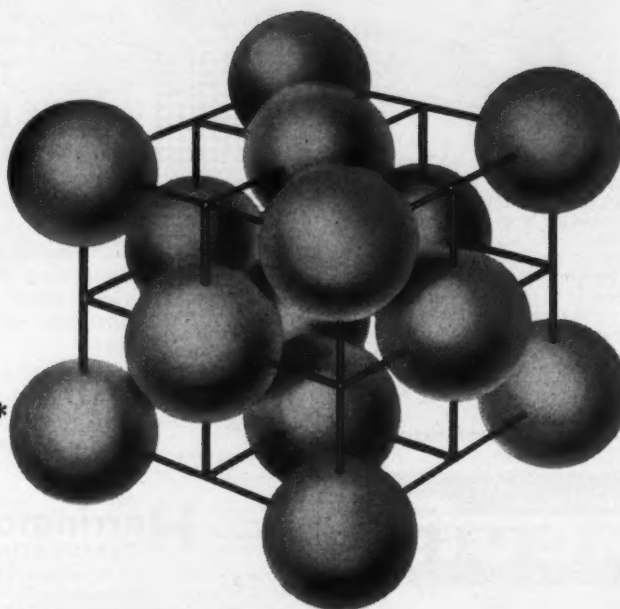
**Tank paints tank**

... when this prototype of a robot painter goes into operation. It is designed to prepare and paint relatively smooth metal surfaces both vertically and horizontally at a speed of about 1/2 ft/sec.

The robot-painter idea is a development of Esso Research and Engineering Company, an affiliate of Humble Oil & Refining Company. Magnets set into rubber treads similar to those on armored tanks keep robot painter stuck to surfaces. An air-operated turbine connected to treads drives the device.

Direction is decided by an operator using pneumatic controls. Paint is fed through a hose under pressure. A pressurized roller applies paint after surfaces have been prepared by a mechanical chipping tool in one continuous motion.

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*Your Judgment Is Worth Ten Times Your Income ... In Reduced Corrosion Losses ...*

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Write, outlining your problem. Corrosion discs are available for testing, and be sure to ask for the valuable technical bulletin "DESIGN FOR HIGHER CORROSION RESISTANCE." It's free.



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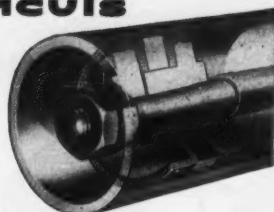
**SPECIALISTS IN STAINLESS STEEL AND HIGH ALLOY CASTINGS**

Check 2354 opposite last page.

## KEEP EFFICIENCY HIGH with DARCOVA



**Pumcups**



**A LOT** of dollars go slipping right past the pistons of reciprocating pumps and cylinders that must be frequently repacked. But Darcova Pumcups keep pump efficiency up, hold slippage and maintenance down!

Pumcup designs include the conventional and 45° bevel types in a full range of sizes for all reciprocating pump and cylinder mechanism requirements.

Because of Darcova's unique design, true texture engineering and precision manufacture, Pumcups outlast other packing at least 3 to 1. Pumcups are available in Nylon as well as other texture-engineered compositions. Write today for your copy of Bulletin No. 5905.

**DARLING VALVE & MANUFACTURING CO.**  
Williamsport 4, Pa.

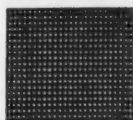


**TRADE MARK**  
**Pumcups**

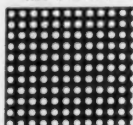
Check 2355 opposite last page.

## H&K Perforated Screens

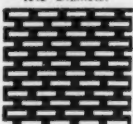
for  
Grading  
Sieving  
Dewatering  
Filtering  
Straining  
Sterilizing  
and Tote  
Baskets



.020" Diameter



.045" Diameter



.028" x .125" Slot



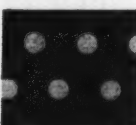
Listed Under  
"Perforated Metals"

Write for  
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Catalog

H&K perforated screens are furnished, to customer order, with holes accurate and uniform in size, shape and spacing. The screen resists blinding as burr-free holes are slightly larger at the bottom. H&K perforated screens can be furnished with margins or unperforated areas in practically any material desired.

H&K specializes in the perforating of stainless steel, monel and other corrosion-resistant alloys.

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Tapered Round  
Holes in Steel



No. 3  
Diagonal Slot

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PERFORATING CO. INC.

Chicago Office and Warehouse New York Office and Warehouse  
5636 Fillmore St., Chicago 44, Ill. 110 Liberty St., New York, N.Y.

Check 2356 opposite last page.

## ENGINEERING & SAFETY

▶ A NEW SOLUTIONS ARTICLE  
"Instant" hot water  
supplied on-the-spot  
by compact heaters

If you're plagued by shortages of hot water in certain areas of your plant, perhaps you should take a tip from West Virginia Pulp and Paper Company, who have whipped the problem at their Luke, Maryland, paper mill.

Low-cost, hot water, used for rinsing, cleanup and general maintenance purposes around the huge paper machines at that installation is supplied instantly — right at



CP Staff Photo

Water heater, operating with 30 psi steam, supplies 100 gpm 140°F water at Luke, Maryland, paper mill

the point of use — by compact steam-heated units that do not require the use of bulky storage tanks or long runs of expensive, insulated pipe.

The heaters, operating with 30 psi steam, turn out up to 100 gpm of 140°F water from 60°F inlet water. Installing them in small spaces presented no problem, since a unit's overall dimensions are only about 25" in diameter by 15" long.

Interior consists of thin-walled copper tubes helically-wound to a 23" (approximate) diameter and clamped together in parallel between the unit's cover plate and casing. All coils are connected to a common header. Total combined length of coils is approximately 27½'.

Water flows through inside of coils. Steam passes over exterior, in opposite direction to water. Water flowing at high

## BETTER TOOLS FOR BETTER WORK

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EP REFINERY TYPE  
TUBE CLEANERS



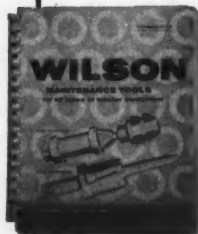
HEAVY-DUTY HEAT EXCHANGER CLEANER



41 AND 44 TUBE EXPANDERS



R CUTTER HEADS



TORQ-AIR-MATIC EXPANDER CONTROL

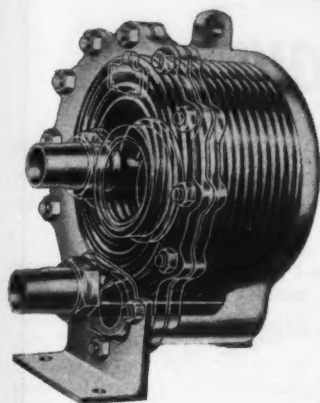
**THOMAS C. WILSON, INC.**

21-11 44TH AVE., LONG ISLAND CITY 1, NEW YORK

Representatives in principal cities • Cable address: "Tubeclean" New York

Check 2357 opposite last page.

velocity through the coils sets up mixing action that results in rapid heat transfer. Overall rate is reported to be 40% higher than that obtained in a conventional tube-and-shell



Phantom view shows interior of heater. Unit has about 27' of helical-wound copper coil

type unit of comparable size.

The heaters are available in various capacities and are adaptable for use with either high- or low-pressure steam. Their initial cost is relatively low and maintenance essentially zero, according to engineers at the paper mill.

(Further information about Heliflow heaters may be obtained from Heliflow Corporation, Graham Manufacturing Co., Inc., 170 Great Neck Road, Great Neck, New York.)

Check 2358 opposite last page.



"Don't worry Bilzik. How could a machine take your job—you don't do anything."

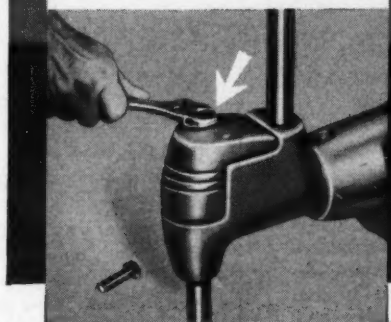
## E-Z CLEAN VALVES...



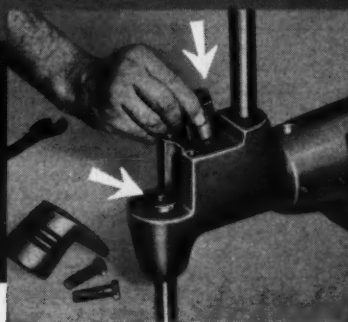
**Perform better...  
Last longer...**

**MORE GOOD REASONS FOR THE  
SUPERIORITY OF AMERICAN  
CONTROLLED CAPACITY PUMPS**

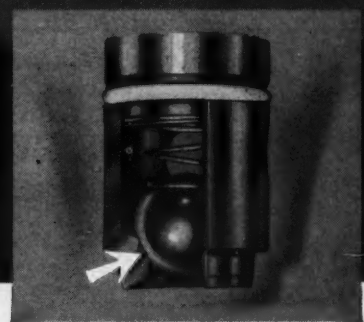
SERIES 300



Quick, Easy Accessibility by simply unscrewing two screws, removing cover. Screws are not exposed to process fluids, in no way disturb piping.



Suction and Discharge Cartridges, not threaded or pressed, lift out. Thread galling is impossible. Use valve cover screw as a tool to lift out cartridge.



Triple Seat Design literally improves valve efficiency with wear. Top seat guides ball, virtually eliminating wear on second and third seats.

**E-Z CLEAN Valves** mean maximum convenience for inspection, cleaning or replacement, actually can be changed in minutes. Valves are available in a variety of corrosion-resistant materials for a wide range of operations. Exclusive American design enables valves to be changed readily without disconnecting piping.

**SPRING LOADED** design increases volumetric efficiency, reduces back-flow and destructive shock-forces due to inertia. Spring reduces time required for complete valve closing, minimizing back-flow and improving accuracy. Spring-loaded valves are particularly effective with slurries and high viscosity liquids.

**TRIPLE INTEGRAL SEATS** actually increase valve life *three times*. The first seat alone would normally provide the service life of a conventional single-seat check valve. Even after wear occurs on the first seat, it continues to act as a guide and virtually eliminates wear on second and third seats.



American Controlled Capacity Pumps are available in three Series illustrated at left—electric and air-operated, wide pressure and capacity ranges. Series 300 Pumps are externally adjustable *while in operation* by a stationary hand-wheel. Internal adjusting mechanism is immersed in oil. Available for automatic adjustment or pneumatic and electric control. Designed and manufactured with American's unmatched skill and experience, these pumps perform with maximum precision, less downtime, lowest possible maintenance and low parts inventory. Write for complete information.

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INCORPORATED ESTABLISHED 1921  
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Gas, Electric, Steam, Oil — Radio Frequency Power

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Over 60 years of service



Check 2360 opposite last page.

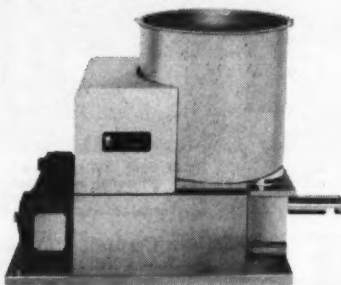
## **New VIBRA SCREW®**

**Feeder**

**with**

**Live**

**Bin**



**provides dependable metering  
of dry materials**

The world acclaimed Vibra Screw dry materials Feeder, with its patented rotating vibrating screw principle, has now been combined with a "live bin" for positive hopping action. This unbeatable combination of vibrating hopper and metering screw is now standard construction. Catalog VS-61 gives the details.



**VIBRA SCREW® FEEDERS, INC.**

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vs/a

Check 2361 opposite last page.

## **ENGINEERING & SAFETY**

**Three concrete ideas:  
waterproof it, patch it,  
and weld it**

Trio of recent developments  
puts new life in old concrete

A threesome of recently developed products have as their goal the waterproofing, patching and welding of concrete. The waterproofing agent, is a clear colorless liquid containing esters of boron and silicon in an aqueous base.

Applied to masonry, it is readily absorbed into the surface and protects against subsequent absorption of water and destruction by freezing and thawing for periods of 5 to 10 years, when correctly applied. Subsequent painting does not alter the protective properties of the agent.

Welding old concrete to new is the function of a bond which eliminates procedure of roughening, chipping, drilling, scarifying and washing when old bases are to be repaired or resurfaced.

The bond can also be used in the concrete mix to increase its resiliency, cohesion and adhesion. Added to mix, it increases the tensile and compressive strength and makes concrete more resistant to abrasion, impact, oil and grease. It is available in 5-, 30- and 55-gal specially lined containers.

If patching is your concrete problem, you should be interested in a compound which is used to repair ruts and holes in concrete or to anchor bolts for machinery. It can be used indoors or out, even at freezing temperatures.

Patching compound develops a compressive strength of more than 2½ tons/sq in. In tests, a force of over 10 tons was needed to pull a steel bolt out of an anchor of the material . . . in less than one hour after pouring.

(Water-proofing agent is product of Industrial Division, Guardian Chemical Corporation, Long Island City, New York.)

Check 2362 opposite last page.

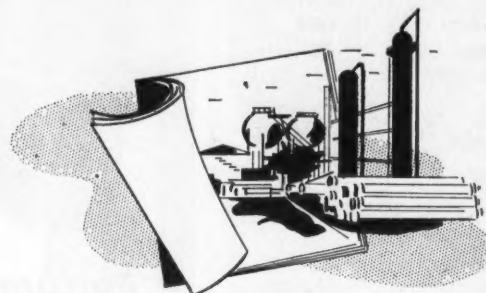
(Power-Grip concrete bond is

▶ A NEW SOLUTIONS ARTICLE

A  
NEW SOLUTIONS  
FEATURE

"New Solutions" articles —

## **PLANT TOURS**



## **AT YOUR DESK**

In these days of the "profit squeeze" . . . and the push for ever lower operating costs . . . how often have you wished for the opportunity to swing through other plants to see how THEY are attacking and solving the same problems YOU have? Trouble is, of course, that you're up to your ears in every-day, urgent tasks that keep you pretty well confined to your own plant.

Well . . . the "New Solutions" articles appearing every month in **CHEMICAL PROCESSING** magazine are designed just for busy men such as you. Each one is, in effect, a guided plant tour you can take without even leaving your desk!

Here are objective, concise reports (often two dozen per issue) that "take you by the hand" and show you how specific manufacturers have matched wits with and won out over some tough processing problems. They're geared to what's happening NOW in moves toward increased efficiency and lower costs in all segments of the operational picture.

You'll find them throughout each issue of **CHEMICAL PROCESSING**. Look for their identification by the "trademarks" shown at the top of this page.

Why not thumb through this issue now? Chances are you'll find an answer to that "toughie" that's been plaguing you for weeks!

product of Dept. PG, The Monroe Company, Inc., 10703 Quebec Ave., Cleveland, O.) Check 2363 opposite last page.

(Stonfil patching compound is product of Stonhard Company, 401 N. Broad St., Philadelphia 8, Pa.)

Check 2364 opposite last page.

### It's full stream ahead when clapper pivots on check valve

Uses: Check-valve applications.

Features: Valve incorporates clapper hinge pin which pivots the clapper out of stream for full pressure and unobstructed passage. It incorporates double O-ring gaskets to eliminate pressure on threads and protect them from outside corrosion.

Description: Synthetic-rubber-seal check valves are non-lubricated. They may operate in vertical or horizontal position. Valves are all equipped



Synthetic-rubber-seal check valves each have clapper hinge pins to pivot clapper out of stream for full pressure and unobstructed passage

with pressure gages or test vents and are available in 2, 2½, 3, 4 and 6" sizes. They can be threaded, flanged or victaulic-grooved at both ends. The valves are currently available in semi-steel and soon will be made in ductile iron and steel.

(Checkaroo valves are product of Frank Wheatley Pump & Valve Mfg., 520 South 33rd W. Ave., Tulsa, Okla.)

Check 2365 opposite last page.

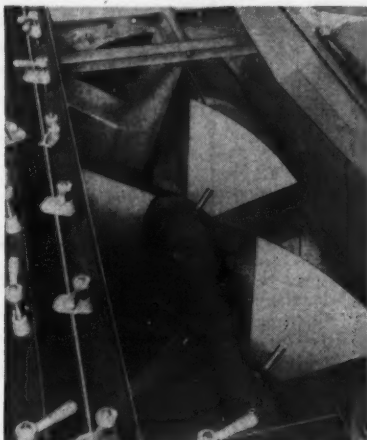
# Counter-current Contactor

... provides continuous, uniform, liquid/solid contact for extracting, leaching, ion exchange, decoloring, deodorizing, crystallizing, washing, flotation exchange, etc.

## Operating principle

Basic section is a horizontal trough with outlet weir to control liquid level. A shaft running down the center of the trough carries paddles arranged to form an interrupted helix. The paddles slowly lift the solid material, tumble it gently and advance it upstream. Scoops at the end of each shaft transfer the solid material from one trough to the next... or to any appropriate vessel or conveyor.

Any number of sections can be combined, in series or in parallel, to accommodate a number of related processes. (See diagram showing use of Contactor for ion exchange.)



View from top of section. Scoops at far end transfer solids to next section upstream.

## Operating advantages

Used in place of batch type equipment such as packed columns, the Contactor offers important advantages:

It allows continuous operation without down time for repacking, flushing, regenerating, etc. Continuous counter-current flow also eliminates start-of-run and end-of-run differences, allows controlled uniform effluent. "Channeling" and its reduction of effluent quality is impossible.

Samples or side streams of liquid or solid or both may be removed or introduced at selected points.

Gentle "lubricated" tumbling minimizes or eliminates attrition of valuable solid materials such as ion exchange resin beads, crystals, etc.

## Design features

Contact surfaces are stainless steel or other workable material. Troughs can be rubber lined.

Troughs can be up to 15' long in diameters from 9 in. to 6 ft. to handle from



A partially assembled Contactor. Entrance port for solid materials is at top of trough at far corner... with discharge end in foreground. Discharge elevator has been disconnected.

a few lbs. to 35 tons or more per hour of solid material.

For certain applications, wipers may be added to the blades to provide a continuous self-cleaning action.

Troughs can be covered and sealed gas tight. Jacketed models show generally higher heat-transfer rate than jacketed columns without coils.

Shaft speeds can be the same or varied in any ratio. These, together with simple liquid-flow valves, provide complete or automatic control of contact time.

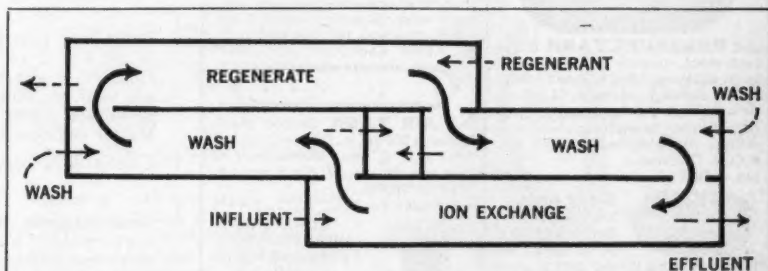
One Contactor may perform a number of processes. It also provides its own conveying between processes. As a result, it often replaces a number of vertical units as well as feed and take-away conveyors... using substantially less plant space.

For comment on suitability and rough cost range of the Contactor for a specific counter-current process, send us a description of the process, samples of the solid material, flow rates, contact time, etc.

## Pilot-plant unit

Our jacketed, atmospheric pilot-plant unit can be scheduled for test operation in your own plant on a rental basis. Write for estimate on availability.

Data on pilot-plant unit: **Capacity:** 4 cu. ft. of solids and 6 cu. ft. of liquid. **Solids flow rate:** Up to 4 cu. ft./hr. with 1 hour retention time or up to 16 cu. ft./hr. with 15 minutes retention. Liquid flow is adjusted to suit solids rate. **Approx. minimum quantities for test:** 5 cu. ft. of solids, 200 gals. of liquid.



Possible arrangement of Counter-current Contactor units for continuous ion exchange. Solid arrows show movement of solids phase (ion exchange resin) which contacts different liquids at each of 4 steps... without mixing the liquids. Ratio of retention times can be varied by using multiple units for any or all steps as required. One or more simple conveyors may be required to transfer solids from unit to unit in multiple-unit, multi-step arrangements.

## GIFFORD-WOOD Co.

Dept CP 12-Hudson, N. Y.

Process, materials-handling and conveying equipment.  
Eppenbach colloid mills and homogenizers.

Check 2366 opposite last page.

# PRAB Conveyors, Inc.

## Problem-Solving Tube-Veyor

- UNIQUE CIRCUIT FLEXIBILITY
- LESS MAINTENANCE
- LOWER COST

- If You Need**
- CLOSED SYSTEMS
  - SELF-CLEANING PROPERTIES
  - POSITIVE ACTION
  - MULTI-PLANAR CIRCUITS
  - HEAVY-DUTY SERVICE

**WE GUARANTEE PERFORMANCE**

Prab engineers are the most experienced tubular conveyor designers in the industry. Hundreds of successful units are in use. Exclusive patents assure most advanced design.

SEND FOR Bulletin #TV-98  
Representatives in Principal Cities

## PRAB CONVEYORS, INC.

30125 GROESBECK HIGHWAY ROSEVILLE (Detroit), MICHIGAN

Check 2367 opposite last page.

## FLUID & GAS PRESSURE TANKS STAINLESS & CARBON STEEL TANKS

### (GOVERNMENT SURPLUS BARGAINS)

Steel tanks for the handling, storage and transportation of gases, beverages, fuels, hydraulic fluids and other liquids. Stainless steel tanks for corrosive acids and gases.



**J-1 PRESSURE TANK** Stainless steel, surplus aircraft oxygen tank. 48" long, 24" dia. Rated for 400 P.S.I. working pressure, 18,000 cu. in. vol., 77.9 gal. capacity. 1/2" pipe thread fitting at each end. New condition. Shipping weight 247 lbs. F.O.B. Chicago.

No. AE832.....\$99.95



**G-1 TANK** Stainless steel. Capacity 2100 cu. in. (9 gals.) 450 P.S.I. 1/2" pipe thread port at each end. 24" long, 12" dia. Shipping weight 19 lbs. F.O.B. Chicago. (Two for \$27.00.)

No. AE63 Each.....\$14.95

**NON-SHATTERABLE CO<sub>2</sub> CYLINDER** This type of pressure bottle was used by the Armed Forces for inflating life rafts. 18 1/2" long, 3 1/2" dia. Has 1/2" pipe thread opening at one end. Capacity 2.98 lbs. of CO<sub>2</sub> at 1800 P.S.I. Shipping weight 10 lbs. F.O.B. Chicago.

No. AE303.....\$2.95



**FREON TANK** Capacity 22 oz. of Freon F22, 6 cc Methyl Alcohol. 18 1/2" long, 2" dia. 1/2" pipe thread opening at one end. Equipped with brass valve. Shipping weight 3 lbs. F.O.B. Chicago. (Six for \$8.00.)

No. AE834 Each.....\$1.50



**D-2 AIR TANK** Carbon steel. Capacity 500 cu. in. (approx. 2 gals.) 450 P.S.I. 1/2" pipe thread port at each end. 24" long, 6" dia. Postpaid. (Two for \$8.50.)

No. AE391 Each.....\$4.95



**CORNELIUS HIGH PRESSURE (1500-2000 P.S.I.) AIR COMPRESSOR** Three cylinder, 3-stage compressor, complete with 27

volt, D.C. 20 amp. motor, with fan. Rated 1500 P.S.I. continuous duty, 2000 P.S.I. intermittent. Pressure switch in base. As released by Air Force, in used, serviceable condition. Covered by our 30 day GUARANTEE. 11 1/2" long, 7" high, 9" wide. Shipping weight 12 lbs. F.O.B. Chicago. Limited quantity.

No. AE549.....\$35.95

Write today for FREE CATALOG of other EQUIPMENT BARGAINS!

## GROBAN SUPPLY COMPANY

1139 SOUTH WABASH AVE., DEPT. AE-12, CHICAGO 5, ILL. Webster 9-3793

Check 2368 opposite last page.

## NEW LITERATURE

Plant Engineering, Safety  
and Fluids Handling

Make-up-air systems are topic of eight-page handbook presenting analysis of needs for, and basic steps to follow in designing, such systems. Handbook is first of a series devoted to specialized applications of direct-fired gas-heating equipment. Heating Handbook DF-200—Reznor Manufacturing Company.

Check 2369 opposite last page.

Self-operated-regulators' hook-ups are diagramed in series of six application guides showing how to provide remote control of steam and water pressure. Such typical problems, as remote control of manual shut-off, remote shut-off by fluid pressure, and electrically operated remote shut-off, are covered in Application Guides AI-6—Spence Engineering Company, Inc.

Check 2370 opposite last page.

Hose coupling goes fast when using quick-connect units displayed in comprehensive 62-page catalog. Guide points out different seals to be used with 575 fluids and gases at various temperatures. Dimensional and weight data, working pressures, flow and pressure drop data are included. Exploded views of the many coupling designs are included. — Catalog 60A may be obtained by writing on company letterhead to Robert Johnson, Snap-Tite, Inc., Union City, Pa.

Radiant-type gas burners' design features, construction, operating principles and advantages are tabulated in 18-page Bul DB-2—Selas Corporation of America.

Check 2371 opposite last page.

Moist-cure concrete is the theme of an 8 1/2 x 11" placard. Importance of proper curing and methods used are illustrated for jobsite personnel. Form RM-124 — The Master Builders Company.

Check 2372 opposite last page.

Small-diameter tube, of stainless steel, nickel, nickel alloys, and super and exotic alloys, and tubular fabricated parts, are taken-up in 20-page catalog . . . setting forth sizes, specifications, finishes, tolerances, chemistry and suitable applications. Bul 13—Platinum Works, Tubular Products Division, J. Bishop & Co.

Check 2373 opposite last page.

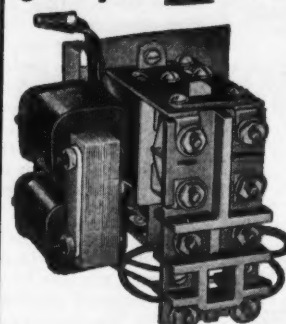
Fuses and lubricating devices are tabulated in 12-page catalog containing photographs and supplying specifications and operating descriptions of complete line. Cat 61—Trico Fuse Mfg. Co.

Check 2374 opposite last page.

# WARRICK

Floatless, Electrode Type  
LIQUID LEVEL CONTROLS

**give you all these advantages!**



No moving parts in the liquid • Easy to install  
• No adjustments necessary • Unaffected by acids or caustics • Unaffected by pressure or temperature • Standard 2&3 pole units listed by U/L

Write for 32-page Catalog which gives complete specifications

Two pole control shown at left

**YOU CAN USE OUR CONTROLS FOR:**

- Single & multiple pumps
- Motor & solenoid valves
- High & low cutoffs & alarms
- Condensate contamination
- Storage tanks
- Volumetric Metering
- Waste sumps

Special controls to custom requirements

**CHARLES F. WARRICK CO.**

1964 W. Eleven Mile Road, Berkley, Michigan  
Dep't 9 Telephone JOrdan 4-6667

Check 2375 opposite last page.



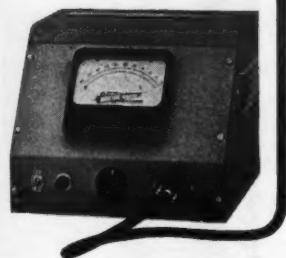
## WHO SWIPED PAGE 43?

D'ja ever pick up a copy of CHEMICAL PROCESSING with an article torn out . . . or even worse, HALF an article torn out?

It's liable to happen when copies are routed around your plant.

You can avoid this annoyance by getting your own copy of CHEMICAL PROCESSING each month. It's easy and there is no charge if you qualify. Just fill in the subscription request form opposite the inside back cover.

If you  
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granular,  
ground,  
powdered,  
loose or  
shredded  
materials



This G-6 by Moisture Register can save you production costs and cut storage losses.

With the G-6 you save lab time. You can make critical moisture tests in just one minute, with a practical accuracy to 0%. No skilled help or special instructions needed, because the right count is registered on an easy-to-read dial—for up to 95% more tests per hour.

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The G-6 is fully guaranteed for one year for all parts and workmanship. Send your order today, or ask for full information. Net Shipping Wt. 60 lbs. \$445.00 F.O.B. Alhambra, Calif.

**ELECTRONIC  
MOISTURE REGISTER**  
INSTRUMENTS

MOISTURE REGISTER CO.  
DEPT. CP, P.O. BOX 910  
ALHAMBRA, CALIFORNIA

Check 2376 opposite last page.



## manufacturers' current literature

This section features a variety of literature currently available from manufacturers. See also the other sections in this issue for new literature pertaining to those particular sections

### Corrosion Control

**Circulating pump** handling salt slurry at 220°F provided trouble-free service for 36 months. Installation is used as an example of cast nickel stainless steel's abrasion and corrosion resistance in detailed reference, "Heat and Corrosion-Resistant Castings — Their Engineering Properties and Applications" — The International Nickel Co., Inc.

Check 2377 opposite last page.

**Hard rubber acid pumps**, centrifugal, rotary gear and impeller types, are detailed in pump manual. Service performance handling 12% hydrofluoric acid and brine are presented. Pump Manual CE-55 — American Hard Rubber Company, Chemical Equipment Dept.

Check 2378 opposite last page.

**Penton piping systems** for corrosive fluids and gases, at temperatures up to 250°F, are unaffected by either inorganic or organic agents including aromatic hydrocarbons. Thermoseal heat tool produces permanently leakproof joints in a matter of seconds — Tube Turns Plastics, Inc.

Check 2379 opposite last page.

**Valves for corrosion**, temperature or pressure problems are completely detailed in technical literature. Units discussed include globe, disc, lift and swing check units. The Wm. Powell Company.

Check 2380 opposite last page.

**Tank linings** of Penton are explained in detail and technical data that includes information on service temperatures, corrosion and chemical resistance. Gar-Line Penton tank linings data — Special Products Department, Garlock, Inc.

Check 2381 opposite last page.

**Pump impellers** of Ni-Resist iron that successfully handle dilute sulfuric acid at 3600 rpm are only one of many subjects covered in 70-page booklet that details nickel-alloy cast irons for corrosion and abrasion resistance. "Engineering Properties and Applications of Ni-Resist" — The International Nickel Company, Inc.

Check 2382 opposite last page.

**How glass pipe** can end pipe corrosion costs is explained in bulletin that enumerates such advantages as corrosion resistance, lack of pickup and contamination, and service temperatures. Bulletin PE-3 — Corning Glass Works.

Check 2383 opposite last page.

**Sealless plastic pump's** ability to handle a variety of problem materials is covered in catalog. Units do not leak and handle corrosive chemicals, gases and slurries with equal ease. Operating temperatures range from -60 to +350°F. Cat 10 — Vanton Pump and Equipment Corp., Div. of Cooper Alloy Corporation.

Check 2384 opposite last page.

**Nickel-plating case histories**, test results and resistance to 53 corrosive media are included in "Industrial Nickel Plating" — The International Nickel Company, Inc.

Check 2385 opposite last page.

### Chemical Materials

**Three aliphatic nitriles**, acetonitrile, n-butyronitrile and isobutyronitrile, formerly available only on a limited basis can now be supplied in commercial quantities. Physical properties and latest specifications are obtainable on request. Eastman Chemical Products, Inc., Subs. of Eastman Kodak Company.

Check 2386 opposite last page.

**Vibrating conveyor** will handle products ranging from powdered materials to pickles for such operations as cooling, washing, dewatering, drying and sizing. Completely enclosed reciprocating drive unit reduces maintenance costs on Ajax Vibrating Lo-Veyors. Conveyor Division, Ajax Flexible Coupling Co., Inc.

Check 2387 opposite last page.

**Diatomite high-bulking filler** is chemically inert and contains up to 93% air space. As little as seven pounds will bulk to a full cubic foot. Product, called Celite, can absorb up to double its weight of liquid. Details on standard and special grades — Johns-Manville.

Check 2388 opposite last page.

# PUMP PROBLEMS

write

## TABER

**BEFORE  
DECIDING  
ON TYPE  
OF  
PUMPS...**

SEE  
**TABER**  
BULLETIN 5

May avoid costly  
pump misapplication.

Vertical pump  
illustrated, for  
handling chemi-  
cals, please re-  
quest Bulletin  
V-837. Horizontal  
Pump, Bulletin  
C-355.

**TABER**  
PUMP CO.

Est. 1859  
291 ELM ST.  
BUFFALO, N. Y.

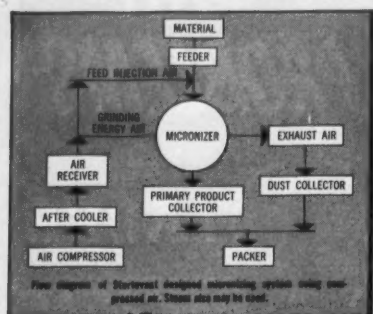


# TABER

Check 2389 opposite last page.

## Need 1/2 to 44 Microns?

**Sturtevant Micronizers\*  
Make 325 Mesh Obsolete**



### One Operation Reduces, Classifies

Sturtevant Micronizers grind and classify in one operation in a single chamber—provide fines in range from 1/2 to 44 microns to meet today's increased product fineness needs. Can handle heat-sensitive materials.

*Production Model\*  
(15 in. chamber)*

### No Attritional Heat

Particles in high speed rotation, propelled by compressed air entering shallow chamber at angles to periphery, grind each other by violent impact. Design gives instant accessibility, easy cleaning. No moving parts.

### Classifying is Simultaneous

Centrifugal force keeps oversize material in grinding zone, cyclone action in central section of chamber classifies and collects fines for bagging. Rate of feed and pressure control particle size.

### Eight Models Available

Grinding chambers range from 2 in. diameter laboratory size (1/2 to 1 lb. per hr. capacity) to large 36 in. diameter production size (500 to 4000 lbs. per hr. capacity). For full description, request Bulletin No. 091.

### Engineered for Special Needs

A 30 in. Sturtevant Micronizer is reducing titanium dioxide to under 1 micron at feed rate of 2250 lbs. per hr. For another firm, a 24 in. model grinds 50% DDT to 3.5 average microns at a solid feed rate of 1200-1400 lbs. per hr. A pharmaceutical house uses an 8 in. model to produce procaine-penicillin fines in the 5 to 20 micron range. Iron oxide pigment is being reduced by a 30 in. Micronizer to 2 to 3 average microns.

Sturtevant will help you plan a Fluid-Jet system for your ultra-fine grinding and classifying requirements. Write today.

### Can Test or Contract Micronizing Help You?

Test micronizing of your own material, or production micronizing on contract basis, are part of Sturtevant service. See for yourself the improvement ultra-fine grinding can contribute to your product. Write for full details. STURTEVANT MILL CO., 119 Clayton St., Boston, Mass.



\*REGISTERED TRADEMARK OF STURTEVANT MILL CO.

Check 2390 opposite last page.

## CURRENT LITERATURE

Isooctyl, decyl and tridecyl alcohols have been steadily decreasing in price and increasing in quality. Technical assistance and complete details on oxo alcohols are available. Enjay Chemical Company, Div. of Humble Oil & Refining Company.

Check 2391 opposite last page.

Methylamines are delivered through nationwide network of storage and shipping facilities. Industrial Chemicals Dept., Commercial Solvents Corporation.

Check 2392 opposite last page.

### Process Instrumentation and Laboratory Apparatus

Differential pressure transmitter is explained in technical bulletin. Accuracy, efficiency and other highlights are explained in booklet dealing with Taylor 212 T Transscope Transmitter. Unit provides linearized flow output without changing parts. Bul 98413 — Taylor Instruments Companies.

Check 2393 opposite last page.

Sight flow indicator's construction, range and advantages are subject of technical data unit. They are available in transparent and reflex types in a wide variety of materials and linings. "Jerguson Sight Flow Indicators Data Unit" — Jerguson Gage & Valve Company.

Check 2394 opposite last page.

Multi-point controller's operation, design and maintenance are covered in technical data sheets. Simple adjustment and inspection are explained together with details on scanning rate, accuracy and range. Instrument Section 52-5 — Thermo Electric Co., Inc.

Check 2395 opposite last page.

Recorder-controllers are available in standard models which convert input signals to records accurate to within  $\pm 0.5\%$ . Pneumatic and electronic versions are taken up, respectively, in Buls 98286 and 98335—Taylor Instrument Cos.

Check 2396 opposite last page.

### Processing Equipment

Separator's performance handling calcined clam shells has provided high capacity throughput with no screen blinding plus low operating and maintenance costs. Material handled runs from fines to 2" pieces, at 100-150°F and 58-60 lb/cu ft. Full details and application data are available. Southwest-ern Engineering Company.

Check 2397 opposite last page.

Immersion heater's design permits replacing the element without draining the container. Complete technical data documents higher heat density and heat transfer efficiency. N. J. Thermex Company, Inc.

Check 2398 opposite last page.

Use of Thermal Fluids in process heating systems and the advantages that can be obtained are detailed in technical bulletin. Installations can be made that will generate up to 20 million Btu/hr and deliver the heat as an unpressurized liquid to multiple use points. Fluids will not support combustion. Tech Bul 1248 — Organic Chemicals Division, Monsanto Chemical Company.

Check 2399 opposite last page.

Grinding and classifying in one operation, in a single chamber, is given attention in engineering bulletin. Operation of Micronizers, models available and test service are all described. Bul 091 — Sturtevant Mill Company.

Check 2400 opposite last page.

Spray nozzle specification is made more accurate and complete by series of nozzle "profiles" that present data on materials, dimensions, flow rate, pressure and angle of spray. Name the problem and the proper profile has the answer. Spray Engineering Company.

Check 2401 opposite last page.

Triple duty agitator available for conventional and steam-jacketed kettles is highlighted in kettle catalog. Stainless steel units are designed for easy cleaning. Illustrated kettle catalog — Hamilton Kettles Division of Brighton Corp.

Check 2402 opposite last page.

### Plant Engineering & Safety

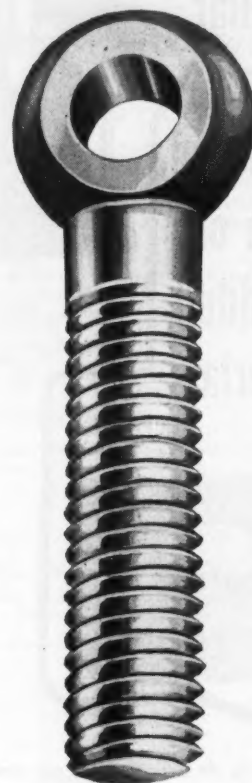
Duo-Chek check valve of 285 pounds performs successfully in service requiring a conventional swing check weighing over 5000 pounds. Installed on a reciprocating compressor discharge line, unit has proven ease of installation and maintenance claims. Complete technical information is available from Mission Valve and Pump Co., Subs. of Mission Manufacturing Company.

Check 2403 opposite last page.

Centrifugal impeller design eliminates gland leakage on pumps designed for abrasive slurries, corrosive solutions, high-density pumps, semi-solids, sludges and slimes. Units are available in capacities up to 3600 gpm which adds up to 100' and particle sizes up to 3/8". The Galigher Co.

Check 2404 opposite last page.

## lower cost EYE BOLTS by an exclusive method



Among Pawtucket's many specialty products are these lower-cost eye bolts or "swing" bolts. Pawtucket's exclusive production method keeps cost low, dimensional accuracy unusually high and strength above standard.

Pawtucket eye bolts are made in standard sizes 1/4" and larger, or to your specifications. In any size, you can depend on uniform Class 3 fit, if required.

All standard steels,  
stainless steels and nonferrous  
metals, including Titanium



FOR THREADED SPECIALTIES...

# PAWTUCKET

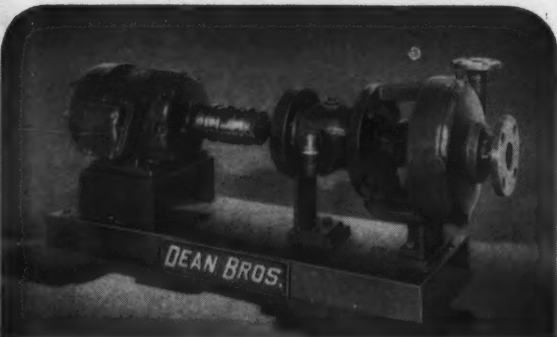
MANUFACTURING COMPANY

327 Pine St. • Pawtucket, R. I.  
THE PLACE TO SOLVE YOUR BOLT PROBLEMS

"The Bolt Man" T.M. REG.

Check 2405 opposite last page

CHEMICAL PROCESSING



### For Greatest Savings in Pumps Get a Dean Brothers GS

Here is the pump that put service back into pumps. And with Dean Brothers exclusive service parts policy, no worry about down time waiting for obsolete replacement parts... there are no such things. One day delivery. Consult yellow pages for nearest representative, or wire, phone or TWX direct for fast dependable service.

Type GS Standard Centrifugal Pumps  
For general, industrial and chemical service  
**Capacity:** to 300 gpm @ 1750 rpm—to 600 gpm @ 3500 rpm  
**Head:** 20 to 80 ft @ 1750 rpm—80 to 300 ft @ 3500 rpm  
**Pumping Temperature:** —150° F to plus 350° F  
**Working Pressure:** to 180 psig @ 350° F

For Full Information Ask for Circular 190

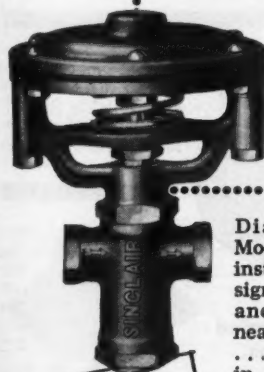


**DEAN BROTHERS PUMPS INC.**

INDIANAPOLIS 7, INDIANA

*The Best Is Our Standard*

Check 2406 opposite last page.



Compact, low-cost

### SINCLAIR-COLLINS PILOT VALVE

Diaphragm-operated S-C Model C-786 valves amplify instrument and cycle timer signals to pilot large valves and similar units. Provide near-instantaneous response... precise control... full 1/4 in. pipe flow area... compact, only 5 1/2 in. high. S-C quality, yet attractively priced. For air, steam, hot or cold water, or inert gas service, 2- and 3-way, 125 psi, tapped 1/4 in. NPT.

for instrument or timer-actuated precision piloting

For more information, write for Bulletin 59-SC. Address Bellows-Valvair, Hydraulics Division, Salem, Ohio, Dept. CP-1261.

8190-3

# Bellows-Valvair

Division of IBEC SALEM 9, OHIO

Check 2407 opposite last page.

DECEMBER 1961

## CURRENT LITERATURE

**Solution to pump problems** by proper application of the right model is subject dealt with in vertical pump bulletin V-837 — Taber Pump Co.

Check 2408 opposite last page.

**Steam-trap selection, installation and maintenance** are among topics covered in 48-page Steam Trap Book — Armstrong Machine Works.

Check 2409 opposite last page.

**Ventilator-exhausters** are portable and easily adaptable for exhausting fumes or foul air from enclosed vessels of all kinds. Brochure describes use in tanks and tank cars. Coppus Engineering Corp.

Check 2410 opposite last page.

**Teflon-jacketed gaskets** provide positive sealing on glass-lined equipment including piping, flanges and fittings. Variations of styles, filler materials and sizes are listed in Cat AD-154 — Garlock Inc.

Check 2411 opposite last page.

**Ease of installation and economy** of saran lined pipe handling hydrogen peroxide and deionized water were proven at Parke, Davis & Company. Systems operate from vacuum to 300 psi and from below zero to 200°F. Saran Lined Pipe Company, Division of The Dow Chemical Company.

Check 2412 opposite last page.

**Pinch Valves** method of closure, with available models, sizes, pressures and temperature limitations are outlined in catalog 609 — Mine and Smelter Supply Co.

Check 2413 opposite last page.

**Centrifugal and diaphragm pumps** are depicted handling dimethyldithiocarbamates and diethyldithiocarbamates in various processing stages. Lined centrifugal handles corrosive liquid while diaphragm pump transfers slurries with a high percentage of suspended abrasives. Full information is available from Dorr-Oliver, Incorporated.

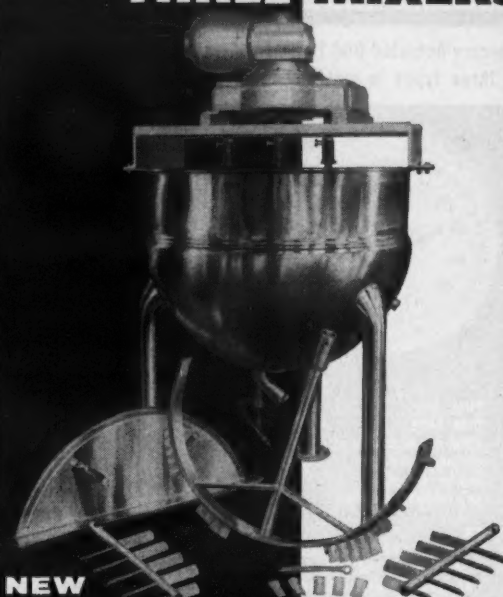
Check 2414 opposite last page.

**Self-priming rotary pump** for carbonyl services, general laboratory operations, and pilot plant work is described in catalog. Materials of construction, resistance to corrosives, capacities and service-temperature ranges are presented. Cat HCT-161 — Eco Engineering Company.

Check 2415 opposite last page.

For more information on developments reported in this section, check corresponding numbers on Reader Service Slip opposite last page of this issue.

## NOT JUST ONE OR TWO, BUT... THREE MIXERS



NEW  
HAMILTON

## TRIPLE DUTY AGITATOR

Pat. applied for

Hamilton's new TD Triple Duty Agitator reduces costs, increases efficiency... makes mixing easier. With combined efforts of three agitators, nothing escapes the mixing process... dead spots are eliminated. Designed to provide the utmost in efficient, economical mixing, the TD gives you the latest in easy-cleaning, sanitary design at a very reasonable cost. For mixing and cooking, specify Hamilton Stainless Steel Kettles. They are efficient, designed for easy cleaning, and precision-built to operate year in, year out with a minimum of maintenance. Write for catalog illustrating conventional and steam-jacketed kettles with or without agitators.

The TD mixer can be used on these standard Hamilton kettles.



Style A  
3/4 jacketed. 15 to 500 gallon capacity. Type 304 or 316 stainless steel. 40, 90, or 125 p.s.i.



Style SA  
Like style A except it has balloon jacket and tubular legs with adjustable feet.



Style CW  
Manually operated tilting kettle, available with hydraulic dump. 30 to 150 gallon capacity. Specials up to 300 gallons. For heavy, viscous products.

ESTABLISHED 1876  
**HAMILTON**  
DIVISION OF BRIGHTON CORP. *Kettles* 820 STATE AVENUE CINCINNATI 4, OHIO

Check 2416 opposite last page.

# PALMER

Mercury Actuated Dial Thermometers now in three types to suit any requirements



FULL 4 1/2" DIAL FACE. Stem can be placed at any angle and case can be rotated to any readable position.

1 RIGID STEM DIAL THERMOMETER tapered bulb, interchangeable with standard industrial thermometer separable socket. (As illustrated above.)

2 WALL MOUNTED DIAL THERMOMETER with flexible connecting armor. Case adjustable to easy reading position.

3 FLUSH MOUNTED DIAL THERMOMETER for panel mounting with flexible connecting armor.

ALL THREE TYPES HAVE A FULL 4 1/2" DIAL FACE.

■ for accuracy: Mercury actuated . . . Compensated by Invar. Guaranteed Accurate 1 scale division. ■ for angularity: Can be adjusted to most readable position at any angle desired. ■ for readability: Bold Black Numbers . . . 11" of scale Reading Dial face can always be placed in easiest readable position. ■ for interchangeability: Also specify "PALMER" Separable sockets as they are interchangeable for Dial or Industrial type Thermometers.

# PALMER

**PALMER THERMOMETERS, INC.**  
Nerwood Ave., Cincinnati 12, Ohio  
MFRS. OF INDUSTRIAL LABORATORY,  
RECORDING AND DIAL THERMOMETERS

Check 2417 opposite last page.

## CURRENT LITERATURE

**Diaphragm valves** handling corrosive bleach liquor have provided leak-tight closure and trouble-free service for three years. A wide choice of body, lining and diaphragm materials are available. Working parts are completely isolated from material in the line to prevent corrosion, abrasion and clogging. Grinnell Company.

Check 2418 opposite last page.

**Eye bolts** are available in all standard steels, stainless steels and nonferrous metals, including titanium. Production method keeps dimensional accuracy high and strength above standard. Bolts made in standard sizes 1/4" and larger or to specification. For technical information, contact Pawtucket Manufacturing Company.

Check 2419 opposite last page.

**Packaged air heaters** are presented in technical bulletin that highlights complete systems. Details on compactness, efficiency and versatility of operation are covered for units ranging in output from 200,000 to 30,000,000 Btu/hr. Bulletin 112 — Thermal Research & Engineering Corporation.

Check 2420 opposite last page.

**Multi-stage centrifugal pump** incorporates both turbine and centrifugal features. It is detailed in Bul 830 — Fred H. Schaub Engineering Company.

Check 2421 opposite last page.

**Problem liquids** can be successfully handled by leakproof Electric-Cand pumps. Units can handle practically any solids-free solution including precious liquids, corrosives, toxic fluids and volatile compounds. Removable, straight can design simplifies field inspection and maintenance. Allis-Chalmers, Industrial Equipment Division.

Check 2422 opposite last page.



"Yes, dammit, I was in the shower!"

**Wheels and chain** with teeth give unusual speed control accuracy in speed changer. Applications, specifications and engineering details are presented in P.I.V. catalog — Link-Belt Company.

Check 2423 opposite last page.

**High-pressure gages** for chemical plants and refineries are available in single or multiple sections with reflex or straight through vision. Multiple section gages are made with one-piece body chamber and are available in a variety of styles including heated or cooled units and frost-proof extensions. Strahan Valves, Inc.

Check 2424 opposite last page.

**Heat exchanger assembly**, disassembly and maintenance is easier with line of air-tools. Catalog 77-88 details two cleaners, expanders, cutter heads and Torq-Air-Matic expander control — Thomas C. Wilson, Inc.

Check 2425 opposite last page.

**Globe valve design** that eliminates galling and reduces corrosion is detailed in Bulletin 7. Details of stem and disc assembly as well as materials of construction are included. Alloy Steel Products Company, Inc.

Check 2426 opposite last page.

**Mechanical packings** and gasket materials are examined in detail specification catalog. Teflon filament packing is among types discussed. Suggested uses include sealing, solvents, acids and corrosive fluids. Cat P-100 — Raybestos-Manhattan, Inc., Packing Division.

Check 2427 opposite last page.

**How flexible couplings** help solve maintenance and lubricating problems is principal subject of engineering catalog that presents complete details on advantages, specifications and performance. Cat 60 — Thomas Flexible Coupling Co.

Check 2428 opposite last page.

**Screwed and socketweld fittings** are detailed in complete engineering catalog that includes data on unions, flanges and other stainless steel units. Camco Fittings, Inc.

Check 2429 opposite last page.

**Guide to selection of proper pump** for a particular service may avoid costly pump misapplication. Horizontal pump Bul C-355 — Taber Pump Company.

Check 2430 opposite last page.

**Industrial rectifier equipment's** role in supplying DC for cranes at low cost and high dependability forms a part of company's "guide." Sel-Rex Corporation, The Meaker Company, Subs.

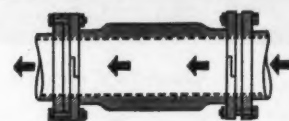
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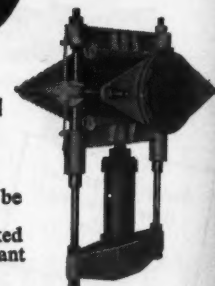
Recesses in sleeve serve as "hinges" during compression.



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CHEMICAL PROCESSING

**Materials Handling**

**Air-diffusers** for restoring flow characteristics to dry, finely ground materials which tend to pack or bridge in storage are detailed in literature which also includes information on bin level indicators. The Bin-Dicator Company.

Check 2433 opposite last page.

**Automatic and manual weighing** plus weight imprinting can be speedily and accurately accomplished with scale units. Deteco Scales, Inc.

Check 2434 opposite last page.

**Tractor-shovel's** role in fertilizer manufacture is one of the industry proven performances outlined in bulletin "Industrial Material Handling From A to Z" which details equipment's specifications and accessories. The Frank G. Hough Co., Subs. of The International Harvester Company.

Check 2435 opposite last page.

**Variable rate vibrating feeder** bulletin outlines capacity, design, feed range and automatic control. Explanation of natural frequency vibration is included. Bul 261 — Engineering Division, The Stephens-Adamson Manufacturing Company.

Check 2436 opposite last page.

**Pneumatic railroad Car** designed to protect resins from contamination and moisture pickup is now being used by 18 of the major producers of polyethylene, polystyrene and polypropylene. The three compartment units protect products and ease unloading in Dry-Flow Chem car. General American Transportation Corporation, Airslide and Dry-Flo Car Division.

Check 2437 opposite last page.

**Air-gravity conveyor** for dry solids handling is subject of technical bulletin. Available accessories, method of operation and construction are discussed. Bul 58-K — Kennedy Van Saun Manufacturing & Engineering Corporation.

Check 2438 opposite last page.

**Handling hydrogen peroxide** properly is aim of manufacturer's four-fold engineering service that includes survey, proposal, installation and inspection. Learn the best handling system for your particular needs. Becco Chemical Division, Food Machinery and Chemical Corporation.

Check 2439 opposite last page.

For more information on developments in this section, check the Reader Service Slip.

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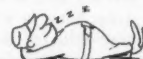
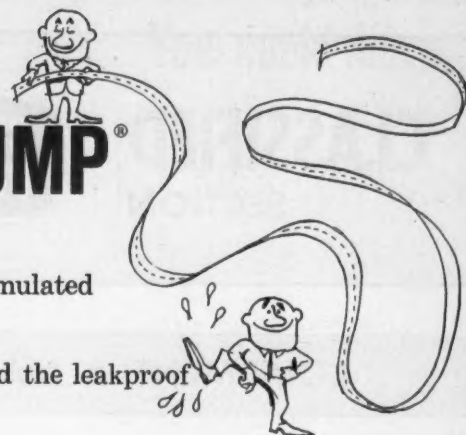
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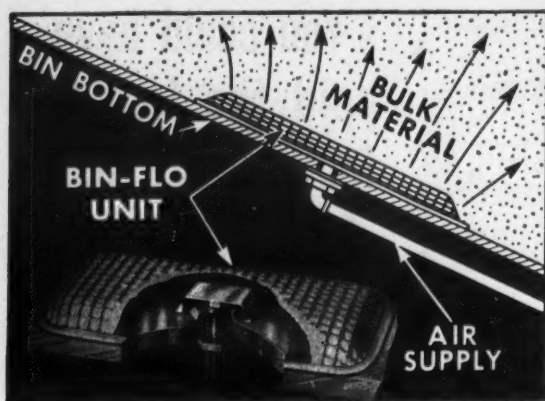
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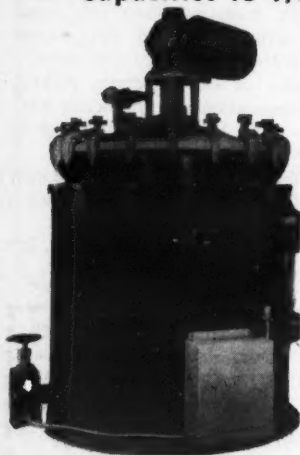
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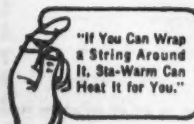


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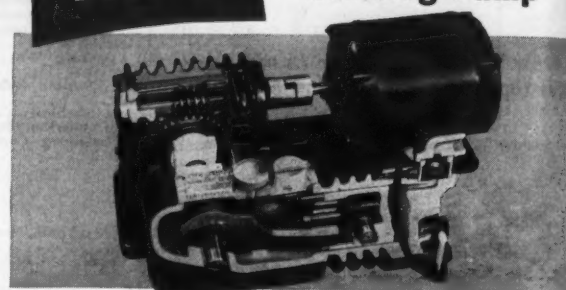
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Widespread use in all fields of electronic knowledge storehouses, he reasons, will require a world-wide, common, logical language—consistent in structure and based on precisely described rules.

***Irradiated  
food on way***

Fresh-like fish and fruits will probably be the first foods, preserved by irradiation, to reach your shelves, AEC officials indicate.

Studies are currently being conducted on the use of low-dose radiation processing of perishable foods. Such processing would provide only temporary protection, but would benefit consumer by cutting some current costs.

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pressure  
self-sustaining process*

C&I's self-sustaining process is accomplished by an extraordinarily efficient compressor-expander set and the carefully treated C&I heat balance know-how. Outside power, one of the major costs in the production of nitric acid, is completely eliminated after start-up. This remarkable process, a C&I exclusive, will produce nitric acid continuously at the guaranteed capacity and efficiency. Plants employing this process are the most economically operated in the world.

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For more information on  
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## COMPLETE DEPENDABILITY

Day after day, month after month, Cameron Ball Valves operate easily and give a tight shut-off. They require no attention from the maintenance men because they are not lubricated, they never stick and there are no glands to require repacking.

With the unique "Rotating Seat" design, each valve operation presents a different surface at the point where flow is "pinched off" and valve seat life is amazingly long. For dependability, elimi-

nation of maintenance expense and freedom from plant shut-downs, install Cameron Ball Valves in your plant. They are available from 2" to 42" and larger in standard trim or special materials to fit your most exacting requirements.



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